Installation and Operating Instructions for the Cobra™ Charger

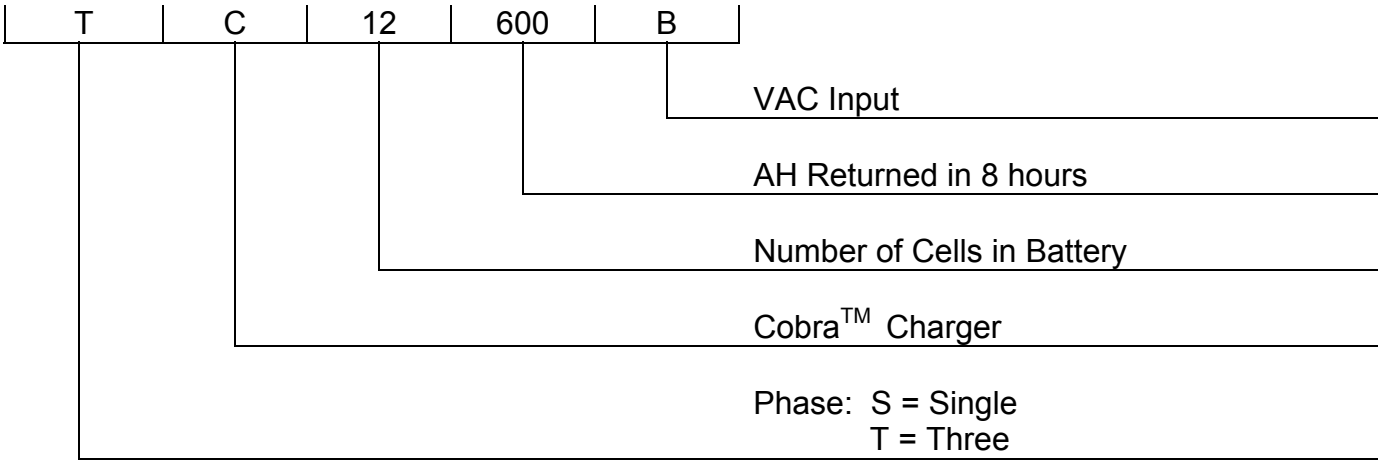
208/240/480/550/575/600 Volts, 60Hz.
220/380/440 Volts, 50Hz.

I.B. 1424
IND 251
Rev M

Model:	S/N:	AC Input Voltage:
Installed by:		Date:

IMPORTANT
Read and understand your user's manual before installing, operating, or servicing this product. DO NOT DESTROY THIS BOOK

Description of Model Number



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IMPORTANT SAFETY INSTRUCTIONS

1. This manual contains important safety and operating instructions. Before using the battery charger, read all instructions, **cautions**, and **warnings** on the battery charger, the battery, and the product using the battery.
2. This charger has been designed to only charge flooded, lead-acid batteries. (It cannot be adapted for sealed batteries.)
3. Read and understand all setup and operating instructions before using the battery charger to prevent damage to the battery and to the charger.
4. **Do not** touch non-insulated parts of the output connector or the battery terminals to prevent electrical shock.
5. During charge, batteries produce hydrogen gas which can explode if ignited. Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.
6. **Do not** connect or disconnect the battery plug while the charger is on. Doing so will cause arcing and burning of the connector resulting in charger damage or battery explosion.
7. Lead-acid batteries contain sulfuric acid which causes burns. **Do not** get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.
8. Only factory qualified personnel can service this equipment. For service, contact the nearest *EnerSys Battery* authorized representative. (1-866-443-9433)
9. De-energize all AC and DC power connections before servicing the charger.
10. The charger is **not** for outdoor use.
11. Do not expose the charger to moisture. Operating **conditions** should be 0º to 104º F; 0 to 70% relative humidity.
12. Do not operate the charger if it has been dropped, received a sharp hit, or otherwise damaged in any way.
13. For continued protection and to reduce the risk of fire, install chargers on a floor of non-combustible material such as stone, brick, or grounded metal.

WARNING: The shipping pallet must be removed for proper and safe operation.

INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

1. Ce manuel contient des informations importantes sur la sécurité et le fonctionnement. Avant d'utiliser le chargeur de batterie, lire toutes les instuctions, les précautions et les avertissements sur le chargeur de batterie, la batterie et le produit utilisant la batterie.
2. Ce chargeur est réglé en usine pour charger des batteries plomb-acide, noyées.
3. Lire et comprendre toutes les instructions de configuration et de fonctionnement avant d'utiliser le chargeur de batterie pour éviter de détériorer la batterie et le chargeur.
4. Ne pas toucher les parties non isolées du connecteur de sortie ou les cosses de la batterie pour éviter une électrocution.
5. Pendant la charge, les batteries produisent de l'hydrogène qui peut exploser s'il est enflammé. Ne jamais fumer, utiliser une flamme vive, ou créer des étincelles à proximité de la batterie. Bien aérer si la batterie est dans un lieu clos.
6. Ne pas connecter ou déconnecter la batterie pendant que la sortie du chargeur est sous tension. Cela pourrait déçlencher un arc et brûler le connecteur entrainant des détériorations du chargeur.
7. Les batteries plomb-acide contiennent de l'acide sulfurique qui cause des brûlures. Éviter le contact avec les yeux, la peau ou les vêtements. En cas de contact avec les yeux, rincer immédiatement à l'eau claire pendant 15 minutes. Consulter immédiatement un médecin.
8. Seul le personnel d'usine qualifié peut entretenir cet équipement.
9. Supprimer la tension des connexions électriques alternatives et continues avant d'entretenir le chargeur.
10. Le chargeur ne doit pas être utilisé en plein-air.
11. Ne pas exposer le chargeur à l'humidite.
12. Ne pas utiliser le chargeur s'il est tombé, s'il a reçu un coup violent, ou s'il a été détérioré de toute autre manière; appeler ou expédier l'appareil au centre d'entretien autorisé *EnerSys General Battery* le plus proche.
13. Pour une protection continue it pour réduir le risque d'incendie, installer les chargeurs sur le sol ou sur un matériau non-combustible comme la pierre, la brique, ou du metal mis à la terre.

CAUTION: DO NOT DESTROY THIS BOOK

This charger has been designed for simple and trouble free installation and operation. This manual has all the instructions for installation, operation, maintenance, service, and parts ordering. Read carefully all the instructions. Any deviation can cause serious and permanent damage. Failure to follow the instructions voids the warranty.

LOCATION

Locate the charger in a clean, cool, dry, and well ventilated area where ambient temperature does not exceed 104^{O}F (40^{O}C). Mount the charger on a level and stable surface. There are holes in the base of the charger to securely fasten it to wall mounting brackets or to a surface.

CAUTION: Operating at greater than 104^{O}F ambient temperature will cause damage to the charger. Call EnerSys General Battery for proper derating of the charger at temperatures greater than 104^{O}F.

WARNING: Do not place flammable material on or near the charger. Place the charger on a nonflammable surface such as concrete, stone or metal.

Leave ample space around the charger to allow for the free flow of air for convection cooling and to provide easy accessibility. Air enters through the bottom of the charger and exits through the sides and back. Locate the charger a minimum of 4 inches from any wall, and 6 inches from any other equipment.

For proper ventilation, do not store excess lengths of charger cables beneath the charger.

INSTALLATION

Connect this equipment to the proper AC supply as specified on the charger's nameplate located on the outside of the charger. Connection to any other voltage or frequency will cause equipment damage.

When selecting the size for an input wire, check the voltage setting, the input current draw, and the fuse size. Reference this information in tables in this manual, or the nameplate of the charger, or the Fuse-Size label located inside the charger next to the fuse block.

The size of the input wire must be in accordance with the National Electric Code (NEC) and other local codes. This charger is for use with permanent wiring routed in an approved conduit.

WARNING: Only use copper conductors.

Make AC connections at the contactor or at the optional AC Disconnect switch labeled "AC Input Connections: L1, L2, L3" located in the upper-right corner inside the charger. The AC connection wires can enter the cabinet from the front, top, or bottom. The user must provide a suitable external AC disconnect switch from the AC power supply to the charger to allow for safe servicing.

WARNING: There is a grounding lug inside the cabinet on the charger frame indicated as shown:

Connect to an external proven reliable ground source to prevent the possibility of electrical shock.

Stacking Multiple Chargers:
All Cobra™ models stack up to three units high to conserve space.

WARNING: Fasten stacked chargers to wall to prevent tipping.

To stack chargers, follow these steps:

1. Position the first charger so that a minimum of 4 inches of space is between the charger and any wall, and 6 inches between the charger and any other equipment.

2. Place the second charger on top of the first charger. Align the bolt holes of the top charger with the bolt holes of the bottom charger.

3. Fasten both charger cabinets together securely using 5/16" bolts and nuts.

4. If a third charger is to be stacked, repeat steps 2 and 3 for the third charger.

5. Attach stacked chargers to the wall using fastening devices suitable to the wall construction.

CHANGING INPUT VOLTAGE

When reconnecting for different input voltages, change the following:

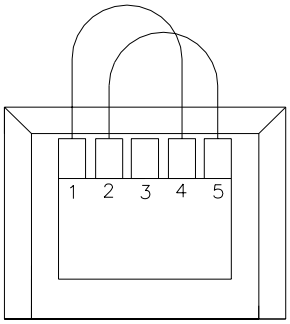
1. Jumpers on the terminal blocks.
2. Jumpers on the control transformer.
3. Input fuses.

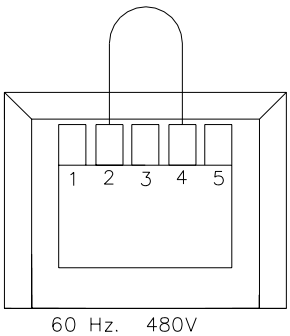
Size the input wires for proper current draw. To make the changes refer to the tables in this manual or the Fuse-Rating label in the charger. For each voltage setting refer to the diagrams, following, to verify the locations of jumper wires on the AC terminal blocks. Check the control transformer wiring.

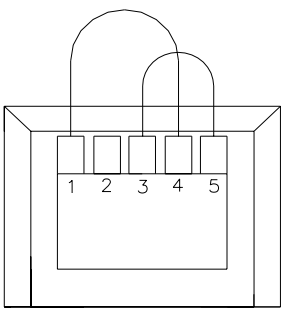
WARNING: Use only the proper AC fuse rating as shown in the Fuse-Rating label or tables in this manual. **Use of other size or rating voids the warranty and UL rating.** Use of other fuse ratings will cause equipment damage or create an unsafe operating condition. Be sure that the AC supply, the number of cells, and the capacity of the battery to be charged correspond with the values shown on the charger's nameplate rating.

WARNING: When changing AC jumper wires, tighten all leads securely into the terminal block. Tighten terminal block screws to a torque value of 20 in-lbs. Loose connections will cause overheating and create an unsafe operating condition.

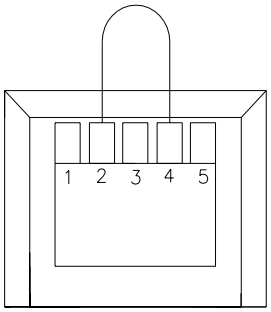
Control Transformer: NOTE: The model "C" (575 volts) control transformer can only be connected in one way.



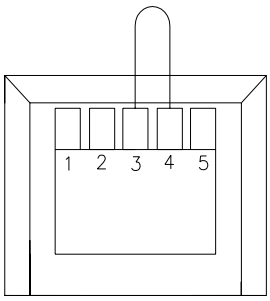




50 Hz. 220V



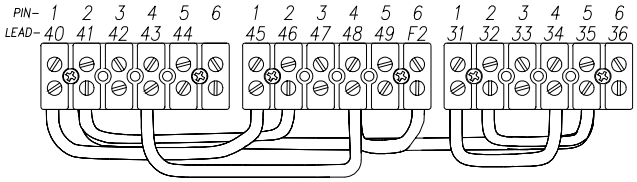
50 Hz. 380



50 Hz. 440

Three Phase, Model B

208 VOLT CONNECTIONS

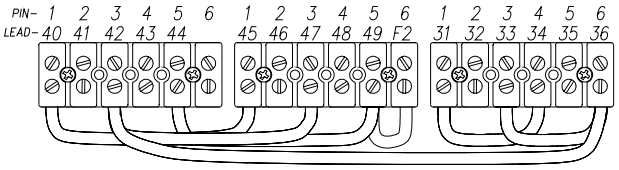


41 TO 46,
31 TO 34,
48 TO 43

41 TO 35,
45 TO 40,

35 TO 32,
F2 TO 48,

240 VOLT CONNECTIONS

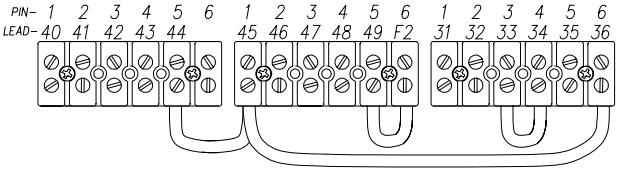


47 TO 42,
49 TO 44,
34 TO 31

42 TO 36,
49 TO F2,

36 TO 33,
45 TO 40,

440/480 VOLT CONNECTIONS



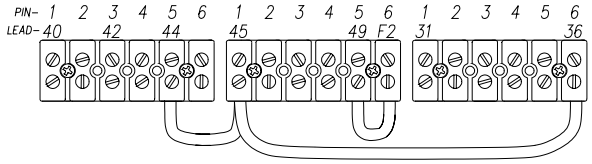
49 TO F2,
34 TO 33

44 TO 45,

45 TO 36,

Three Phase, Model C

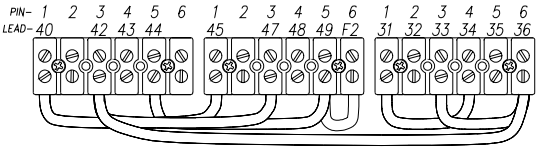
575 VOLT CONNECTIONS



44 TO 45, 49 TO F2, 45 TO 36,

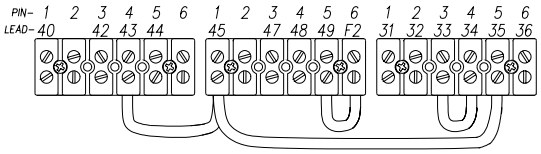
Three Phase, Model D

220 VOLT CONNECTIONS



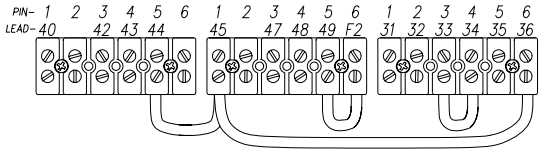
47 TO 42, 49 TO 44, 34 TO 31 — 42 TO 36, 49 TO F2, — 36 TO 33, 45 TO 40,

380 VOLT CONNECTIONS



49 TO F2, 34 TO 33 — 43 TO 45, — 45 TO 35,

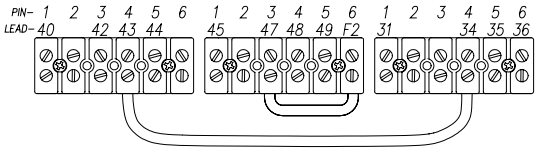
440 VOLT CONNECTIONS



49 TO F2, 34 TO 33 — 44 TO 45, — 45 TO 36,

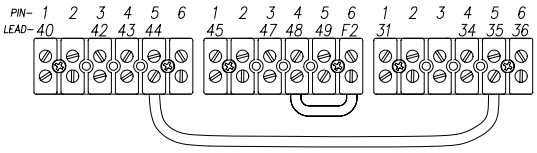
Three Phase, Model J

480 VOLT CONNECTIONS



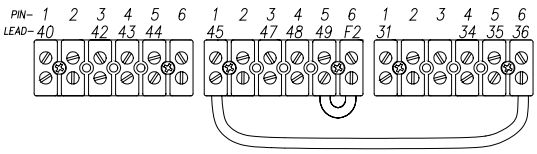
43 TO 34, — F2 TO 47,

550 VOLT CONNECTIONS



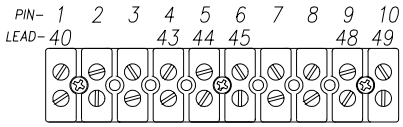
44 TO 35, — F2 TO 48,

600 VOLT CONNECTIONS



45 TO 36, — F2 TO 49,

Single Phase, Model B



208VAC CONNECTIONS

JUMPER 40 TO 45
JUMPER 43 TO 48

FUSE 1 TO 40
FUSE 2 TO 48

240VAC CONNECTIONS

JUMPER 40 TO 45
JUMPER 44 TO 49

FUSE 1 TO 40
FUSE 2 TO 49

480VAC CONNECTIONS

JUMPER 44 TO 45

FUSE 1 TO 40
FUSE 2 TO 49

OPERATION

Cobra™ charges batteries with the same cell size and ampere hour (AH) rating as listed on the charger's nameplate. If the battery's AH rating is other than the AH rating specified on the charger's nameplate, contact your EnerSys General Battery service representative. Your service representative may be able to reconfigure the charger to a different AH rating.

Factory Set Operating Instructions:
Cobra™ is factory set for Auto-Start, DV/DT termination, Time-Voltage termination, and Auto-Equalize every fifth cycle.

When AC power to the charger starts with no battery connected, these messages will display in rotation on the front panel:

Conn (connect)
bAtt (battery)

When a battery is first connected to a powered-up charger, the display will show the message "Strt" which indicates that the charger is starting.

In 5 seconds, the charger will start outputting Start Rate current, and the display will begin to show:

000A Charger current in amps.
0.000 Volts per cell.
0000 Amp hours returned to the battery.
00:00 Time spent in the charge cycle.

These values display in rotation for about 3 seconds each. Other messages display in this scrolling display as needed. Reference the table following for a list of all messages shown in the display.

When the Gassing-Voltage point occurs (factory setting is 2.37 v/c), the 80% LED will light, the On LED remains on, and the display will show the message, “80PC”.

After the current tapers to the Finish Rate current, the Finish LED will light. The LED’s that were lit before will continue to be lit. Charging will continue until the time in Finish Rate meets the termination method’s requirements. The charger will Auto Stop and the display will read “donE”.

When the charge cycle completes, the cycle counter increments by 1. If this was an Equalize charge cycle, the cycle counter resets to 1.

When the number of charge cycles equals the Auto Equalize setting, the battery receives an Auto-Equalize charge with the charge cycle continuing for 3 more hours. The display will continue to show the messages listed above, with “EquL” added to the list. At the end of 3 hours the charger stops, and the display contains “donE”.

If the battery remains connected to the charger for 12 hours (factory default setting) after the completion of a charge, a Refresh charge will automatically begin. A Refresh charge takes 20 minutes. A Refresh message will display when the charge is being given, and a Charge Complete message will display when the Refresh charge finishes.

Display Messages

Display	Message	Mode	Description
000A	Amps	Charge	Charge current in amps.
0.000	V/C	Charge	Volts per cell.
0000	AH	Charge	Amp hours returned to battery.
00:00	Hour:Minute	Charge	Time spent in charge cycle.
80PC	80 percent reached	Charge	Displays when gassing voltage is reached.
Clrd	Fault cleared	Select	Faults are cleared.
CLrF	Clear fault	Select	Clears fault message.
CodE	Pass code made	Select	For EnerSys General Battery representatives.
Conn bAtt	Connect battery	Idle	Displays after charge stops while battery is in cool down period.
Cool	Battery cool down	Display	Displays after charge stops while battery is in cool down period.
CyCL	Equalize cycle	Select	Sets Equalize cycle count.
dELy	Set delay	Select	Delay start time.
donE	Charge completed	Display	Displays after a charge is complete and the cool down period is over.
EquL	Equalize charge.	Charge	Displays when equalize charge begins.
FAtL	Fatal fault	Fault	Must take appropriate action before fault can be cleared.
HdSt	Hand start	Manual	Start pushbutton must be pressed to start charger.
Hour	Hour	Select	Set amount of time for delayed start.
OFF	Delay start off	Select	Turns off Delay Start function.
ON	Delay start on	Select	Turns on Delay start function to allow to set Delay Start time.
rEFS	Refresh	Charge	Displays when a refresh charge cycle begins.
rESt	Restart	Fault	Restarts automatically after AC power failure.
StoP	Charge stopped	Display	Displays when the stop pushbutton is pressed while a charge is in progress.
Strt	Starting charge	Display	Indicates that the charger is starting.

CHARGER FEATURES AND FUNCTIONS

Charge Mode - Automatic / Manual
This charger operates in either Automatic or Manual mode. The factory default setting is Automatic mode.

In Automatic mode, after detecting a battery, the control circuitry will Auto Start a Daily or an Equalize charge cycle in 5 seconds. With a delay time programmed into the control, automatic mode will wait the specified amount of time and then start the charge cycle.

In Manual mode, after detecting a battery, the display will contain “HdSt”. Pressing the Start pushbutton begins the charge cycle.

Manual Equalize is in either Automatic or Manual modes. Push the Equal pushbutton to start an Equalize cycle.

AC Power Failure
The control circuitry detects AC power failures or brownout conditions. If this occurs, the control circuitry saves key information concerning the charge cycle electronically, and the display contains “ACFt”. When power returns, the control circuitry retrieves this information automatically, and the display will contain “reSt”. With a battery connected to the charger, charging automatically continues after a random delay from 0 to 1 minute.

WARNING: With a battery connected to the charger at the moment power returns, the charge cycle continues from the point it was before the power failure occurred.

Fault Condition Monitor
The charger control circuitry constantly monitors for several Fault conditions. If a fault should occur, the charge in progress is interrupted and the Fault LED lights. A Fault message displays on the front control. Reference the Fault messages following.

Determine the cause of the fault and correct it before resetting the Fault Condition monitor and trying to charge the battery again. Clear the Fault code by using the CLEAR FAULTS (CLrF) select function, or by disconnecting and re-connecting the battery.

If the fault code is “t-2F” or “t-1F”, then you must disconnect and reconnect the battery twice. Disconnecting the battery the second time resets the timers.

Fault Messages

Messages	Description	Possible Causes
ACFt	Displays if the AC line voltage falls below 10% of the nominal line voltage.	Check the complete contactor coil string and associated wiring. AC brownout. AC failure. Bad AC fuse(s).
-dLt	Displays when the battery voltage satisfies a decreasing slope; related to the sample period.	Battery charge, battery problems such as: cell problem. heating problem. hot battery.
Eror	Displays if it detects battery voltage above 3.00 volts per cell before charger starts.	Battery with a larger cell size than charger’s nameplate rating. Wrong charger cell size setting. Sulfated battery.
Hi A	Displays if it detects DC output current for longer than 5 seconds above 27% of the AH setting.	Battery problem. Severe line shifts. AC taps set to 208 with 240 VAC applied. SCR locked on.

Messages	Description	Possible Causes
HiAH	Displays when 220% of the charger's AH rating have been delivered to the battery.	Battery does not match AH range on nameplate. Charger's AH rating programmed wrong. SCR failure during last use.
Hi b	Displays if it detects battery voltage above 2.40 volts per cell before charger starts. Displays when the battery reaches 3 v/c of the battery cell size the charger has been set to. Fault LED will be lit.	Battery with a larger cell size than charger's nameplate rating. Charger cell size programmed wrong. Wrong charger cell size setting.
Lo A	Displays if DC output current falls 30% below finish current setting for longer than 5 seconds.	Loose connection in DC output string (shunt, cable, etc.). Battery intercell connector problem. Severe line shifts. Severely sulfated battery.
Lo b	Displays if it detects battery voltage below 1.7 volts per cell before charger starts.	Battery cell size smaller than charger's nameplate rating. Charger cell size programmed wrong. Wrong charger cell size setting.
no b	No battery voltage when expected.	Charger output shorted. Capacitor shorted.

Fault Messages

Messages	Description	Possible Causes
OPEn	Displays if DC current falls below the minimum setting.	DC cable disconnected during charge. DC fuse open. Loose connection in output string. Battery problem. Reverse polarity. Check charger/battery connector. Shorted caps.
t-1F	Displays when the charger does not reach the 80% point within 9 hours.	Battery's AH larger than the charger's AH rating. Battery temperature too high. 80% point set too high. Battery's cell size smaller than charger's cell size.
t-2F	Fails to complete the charge cycle within 15 hours (factory default) of the start of charge.	Battery AH rating larger than the charger AH rating. Battery temperature too high. Defective AC fuse. Capacitor. Diode.
Up b	Displays if the up battery or finish rate reject is satisfied.	Charged battery. Cold battery. Sulfated battery. 80% point set too low. Battery cell size larger than charger cell size.

VIEWING AND CHANGING PARAMETERS

Two modes of operation are available:

1. Display mode, used to view charge cycle data.
2. Select mode, which is used to clear faults, enable delay start, equalize count, etc.

Display Mode
Push the Up- and Down-Arrow pushbuttons to display the information described in the following table. The Display mode is available whether or not the charger is in a charge cycle.

Display Mode Information

Message	Description
000A	Displays the DC current to the battery.
0.000	Displays the voltage per cell.
0000	Displays the cumulative AH returned to the battery.
00:00	Displays the time spent in the current charge cycle.
00	Displays the cell size of the battery.
0000	Displays the battery AH rating.

Select Mode
To enter the Select mode, press the Select pushbutton. "CLrF" will appear in the display. Use the Up- and Down-Arrow pushbuttons to scroll through the variables. To exit Select mode and return to Display mode, press the Equal pushbutton.

The following table describes the variables you can change in Select mode. The following sections describe how to change each variable.

NOTE: Select mode is not available during a charge cycle.

Select Mode Variables

Display	Description
CLrF	Clears fault messages.
Clrd	Faults are cleared.
dELy	Delay start time. Used when the charger is set to Automatic mode. Determines how long the charger will wait before beginning the charge cycle after the control circuitry determines that a battery is connected.
EquL	Set Equalize charge. Determines when an Equalize charge cycle will automatically occur. The Equalize counter determines how often an Equalize charge cycle will occur. When the cycle counter = Equalize counter, an Equalize charge cycle occurs, and after the Equalize charge completes, the cycle counter will be reset to 1.
CodE	For EnerSys General Battery service representatives.

Setting the Delay Start Parameter
"dELy" specifies the amount of time the charger will wait before beginning a charge cycle.

1. Press the Select pushbutton if you want to view or change the value of this parameter. After the Select pushbutton is pressed, ON or OFF will display.
2. To turn off Automatic delay, put OFF in the display, and press the Select pushbutton.
3. To turn on Automatic delay or to change the time of the delay, put ON in the display and press the Select pushbutton.
4. To view or change the parameter, press the Select button once again. A time (hours, minutes) will now display.
5. Use the Up- and Down-Arrow keys to change the value in the display.
6. Press the Select pushbutton to save the new value you just entered.

7. Press the Equal pushbutton twice to exit the User level.

Setting the Equalize Parameter
If the charger is running in Automatic mode, an Equalize charge cycle will begin when the cycle counter equals the Equalize counter. After an Equalize charge cycle, the cycle counter resets to 1, and the Equalize parameter will remain the same.

To change an Equalize parameter, follow these steps:

1. To view or change the value of the Equalize Counter parameter, press the Select pushbutton to display the value of the parameter.
2. Use the Up- and Down-Arrow keys to change the value in the display.
3. Press the Select pushbutton to save the new value you just entered.
4. Press the Equal pushbutton twice to return to Select mode.

Setting the Clear Fault/Faults are Clear Parameter
To clear a fault or to verify if the fault monitor contains a fault code, please follow these steps.

1. Use the Up- and Down-Arrow pushbuttons to scroll through the variables. display “CLrF” or “Clrd”.

2. a. If the display shows “Clrd”, then there are no faults in the fault monitor.
   b. If “CLrF” (clear faults) displays, press the Select pushbutton to clear the faults.
3. If FAtL displays when using the CLrF function, then you must disconnect and reconnect the battery twice, or push the Select pushbutton after unplugging battery. the only Faults that should cause this are t-1F and t-2F.

Pressing the Equal pushbutton will exit you from the Select mode, but will NOT clear the faults.

Pass Code Parameter
The pass code parameter is available to qualified and authorized representatives of EnerSys General Battery only. Any attempt to enter and modify variables by unauthorized persons WILL void the warranty and may cause damage to the charger and/or battery.

MAINTENANCE

This charger requires a minimum of maintenance. Connections and terminals should be kept clean and tight. The unit should be periodically cleaned with an air hose to prevent any excessive dirt build up on components. Care should be taken not to bump or move any adjustments during cleaning. Make sure that both the AC lines and the battery are disconnected before cleaning. The frequency of this type of maintenance depends on the environment in which this unit is installed.

SERVICE

For service, contact your sales representative or call:

1-866-443-9433 (United States)
1-800-693-9433 or
905-790-1212 (Canada)

Or visit us at our website: www.enersysmp.com

Glossary of Cobra™ Terminology:

Definitions of terms used as they apply to the Cobra™ charger. Use in other applications may or may not have different meanings.

AMP HOUR (AH)	Amount of amps delivered over a period of time. Example: 100 amp draw of 2 hours equals 200 AH.
AUTOMATIC MODE	Factory enable. After a 5 second delay, the charger automatically starts when it detects DC voltage within the start range parameters. charge automatically stops when one of the termination methods or fault conditions is met.
COBRA™ FINISH	Programmable constant current finish rate. Factory setting is 4.5 amps per 100 AH of charger nameplate rating. It provides superior recharge capability because it is not affected by battery age, condition or temperature.
COOL DOWN	Programmable amount of time after charger termination before Charge Complete LED lights. Factory setting is enabled an 6 hours in length.
DELAY START	Delays start of charge in one minute increments up to 18 hours and 12 minutes. Factory setting is off and should be programmed at user site for specific application. Useful for energy management or to allow battery to warm up or cool down to nominal 77° F before charging.
DV/DT TERMINATION METHOD	Change of voltage over change of time. Factory setting is enable. Sampling period is programmable to increase or decrease amount of charge time.
FAULT MONITOR	Displays fault messages to ensure safe charger operation to prevent battery or charger damage. Various fault conditions are constantly monitored. Some may disable the charger, others warn of possible problems.
FERRORESONANT TRANSFORMER	Transformer design utilizing capacitance in the secondary circuit. Battery volts determines the DC output. Regulation of output current requires no electronics or sophisticated controls thus ensuring trouble-free and fail-safe operation.
FINISH RATE REJECT	If battery reaches Cobra™ finish within 1 minute of start, charge terminates in 10 minutes.
GASSING VOLTAGE	Point in charger cycle when battery has reached 80% recharge, often referred to as “80% point”. Factory setting is 2.37 v/c and is programmable for various operating conditions.
LED	Light emitting diode. Used as indicator lights on front panel.
MANUAL MODE	Factory disabled. Cobra™ may be programmed to require operator to push the start button. Charge automatically stops when one of the termination methods or fault conditions is met.
MODE	Phase or area of charger cycle; display, select, charge.

NAMEPLATE RATING	Unalterable factory configuration of charger capabilities, I.E., cell size, maximum DC output,. AH capacity.
OVERRIDE TIMERS	Prevents damage to the battery if certain conditions are not met. Factory settings are 9 hours to gassing voltage and 15 hours maximum charge time. They are programmable to compensate for operating and battery conditions.
PARAMETER	Function inside a mode such as equalize, delay, pass code, etc.
RANDOM DELAY START	After an AC brownout or power failure, charger momentarily delays to help reduce peak power demands. Chargers delay in one minute increments up to a maximum of 10 minutes. Delay time increment is not programmable and determined at the time of manufacture. Factory setting is enable.
REFRESH	If a battery remains connected for a specified amount of time after charge completion, a brief recharge takes place. Factory setting is enable, 12 hours wait time,. and 20 minutes in duration. All variables are programmable.
SCR	Silicon controlled rectifier. Used to provide Cobra™ finish.
SELECT	The charger operation mode used to view or change parameters.
START RATE	Factory design regulating DC output current to approximately 20 amps per 100 AH of nameplate rating. Severe AC line shifts of greater than +/- 10% and battery voltage effect start current. Age, condition, temperature, and state of discharge determine battery voltage.
TERMINATION METHODS	Factory setting is both T/V and DV/DT. Each can be used independently. It also utilizes several override times and fault monitors to ensure safe charger operation.
TIME VOLTAGE TERMINATION METHOD (T/V)	Amount of time until charger terminates after reaching gassing voltage. Factory setting enabled and 4 hours in length. Time is programmable to compensate for various operating conditions.
UP BATTERY REJECT	If battery reaches gassing voltage within 6 seconds of start, charge terminates in 10 minutes.
VARIABLE	Individual item inside a parameter: Examples: Equalize -cycle; Delay - on/off; Pass code - Cool down, random delay start, refresh, etc.
VOLTS PER CELL (V/C)	Average reading of volts per cell as calculated by measuring battery terminal volts and divided by cell setting.
WAIT TIME	Amount of programmable time (usually in minutes) until a particular function takes place, i.e. delay, equalize, refresh, etc.

REPLACEMENT PARTS

Model Number Suffix	Voltages
B	208/240/480 (60 Hz)
C	575 (60 Hz)
J	480/550/600 (60 Hz)
D	220/380/440 (50 Hz)

SC COMMON PARTS			
Base	013-328-1DG	Panel	X052-242VB
Door	X052-242VB	Latch	X044-1-30
Side	X057-328-2DG	Back	X057-328-3DG
Top	X057-328-4DG	Snubber Ass'y	X1100-214-2
Wire Group	X1106-14-28	PC Board	X1060-64-2
2 Amp Fuse	X014-7-28	Membrane Switch	X002-46-5
PC Mntg Panel	159-6-2272VB	SCR	R507-17-15
Display Board	X1060-73-1	Term Blk, 6 Pole	256-D-32
Term Blk, 10 Pole	256-D-33	Conversion Kit	X225-91-1

TC COMMON PARTS			
Base	013-326-1DG	Panel	X052-241VB
Door	X054-326-6MG	Latch	X044-1-30
Side, Left	X057-326-3DG	Side, Right	X057-326-4DG
Back	X057-326-2DG	Top	X057-326-5DG
Snubber Ass'y	X1100-214-2	Wire Group	X1106-14-9
PC Board	X1060-64-2	2 Amp Fuse	X014-7-28
Membrane Switch	X002-46-5	PC Mntg Panel	159-6-2272VB
SCR	R507-17-15	Display Board	X1060-73-1
Term Blk, 6 Pole	256-D-32	Conversion Kit, TC to TCG	X225-91-1

Line contactor: X129-62-53 (40Amp), and X129-62-54 (60Amp)
Control transformers: X127-61-1 (B model), X127-61-2 (C model), X127-61-3 (D model), and X127-61-4 (J model)

Match the capacitor value under each model and use the following correlation to order by part number.

029-136-16D	2.5MFD	029-136-18D	4MFD	029-136-12D	10MFD	029-136-14D	15MFD
029-136-17D	3MFD	029-136-11D	5MFD	029-136-13D	12MFD	029-136-15D	18MFD

New capacitor brackets should be requested when ordering these capacitors.

Single Phase, Model B

Model	Main Transformer	Cap Value 1	Cap Value 2	208/240V AC Fuse	208/240V Fuse Value	480V AC Fuse	480V Fuse Value
6-450B	X127-63-204A	3MFD	3MFD	X014-4-14	10	X014-4-10	6
6-550B	X127-63-206A	12MFD	n/a	X014-4-9	15	X014-4-10	6
6-600B	X127-63-206A	12MFD	n/a	X014-4-9	15	X014-4-10	6
12-225B	X127-63-213A	10MFD	n/a	X014-4-14	10	X014-4-10	6
12-380B	X127-63-215A	5MFD	4MFD	X014-4-12	20	X014-4-19	8
12-550B	X127-63-217A	10MFD	3MFD	X014-4-6	30	X014-4-9	15
12-600B	X127-63-123A	15MFD	n/a	X014-4-6	30	X014-4-9	15
12-775B	X127-64-171A	10MFD	10MFD	X014-4-1	35	X014-4-12	20
12-865B	X127-64-241A	10MFD	12MFD	X014-4-15	40	X014-4-12	20
18-550B	X127-64-137A	2.5 MFD	18MFD	X014-4-17	45	X014-4-12	20
18-600B	X127-64-138A	18MFD	3MFD	X014-4-17	45	X014-4-12	20
18-680B	X127-64-724A	10MFD	15MFD	X014-4-2	50	X014-4-16	25

18-775B	X127-64-724A	15MFD	10MFD	X014-4-2	50	X014-4-16	25
18-865B	X127-64-210A	15MFD	18MFD	X014-4-11	60	X014-4-6	30
24-450B	X127-64-145A	10MFD	10MFD	X014-4-17	45	X014-4-12	20

Three Phase, Model B

Model	Main Transformer	Cap value 1	Cap value 2	208/240V. AC Fuse	208/240V. Fuse value	480V. AC Fuse	480V. Fuse value
12-450B	X127-63-213A/B	10MFD	n/a	X014-4-6	30	X014-4-24	12
12-550B	X127-63-214A/B	5MFD	2.5MFD	X014-4-9	15	X014-4-19	8
12-600B	X127-63-214A/B	5MFD	2.5MFD	X014-4-9	15	X014-4-19	8
12-680B	X127-63-215A/B	5MFD	4MFD	X014-4-12	20	X014-4-14	10
12-775B	X127-63-215A/B	5MFD	4MFD	X014-4-12	20	X014-4-14	10
12-865B	X127-63-216A/B	12MFD	n/a	X014-4-16	25	X014-4-24	12
12-960B	X127-63-217A/B	10MFD	3MFD	X014-4-6	30	X014-4-9	15
12-1050B	X127-63-217A/B	10MFD	3MFD	X014-4-6	30	X014-4-9	15
18-380B	X127-63-130A/B	4MFD	4MFD	X014-4-12	20	X014-4-14	10
18-600B	X127-64-132A/B	10MFD	n/a	X014-4-16	25	X014-4-14	10
18-680B	X127-64-134A/B	10MFD	3MFD	X014-4-6	30	X014-4-9	15
18-775B	X127-64-134A/B	10MFD	3MFD	X014-4-6	30	X014-4-9	15
18-865B	X127-64-135A/B	15MFD	n/a	X014-4-6	30	X014-4-9	15
18-960B	X127-64-137A/B	18MFD	n/a	X014-4-15	40	X014-4-12	20
18-1050B	X127-64-137A/B	18MFD	2.5MFD	X014-4-15	40	X014-4-12	20
18-1200B	X127-64-138A/B	18MFD	3MFD	X014-4-2	50	X014-4-16	25
18-1400B	X127-64-724A/B	10MFD	15MFD	X014-4-2	50	X014-4-16	25
18-1500B	X127-64-724A/B	10MFD	15MFD	X014-4-2	50	X014-4-16	25
24-450B	X127-63-140A/B	10MFD	n/a	X014-4-16	25	X014-4-24	12
24-550B	X127-63-142A/B	15MFD	n/a	X014-4-6	30	X014-4-9	15
24-600B	X127-63-142A/B	15MFD	n/a	X014-4-6	30	X014-4-9	15
24-680B	X127-64-144A/B	18MFD	n/a	X014-4-15	40	X014-4-12	20
24-775B	X127-64-144A/B	18MFD	n/a	X014-4-15	40	X014-4-12	20
24-865B	X127-64-145A/B	10MFD	10MFD	X014-4-2	50	X014-4-16	25
24-960B	X127-64-147A/B	12MFD	12MFD	X014-4-2	50	X014-4-16	25
24-1050B	X127-64-147A/B	12MFD	12MFD	X014-4-2	50	X014-4-16	25
36-380B	X127-64-342A/B	15MFD	n/a	X014-4-15	40	X014-4-12	20
36-550B	X127-64-151A/B	12MFD	12MFD	X014-4-11	60	X014-4-6	30
36-775B	X127-64-193A/B	12MFD	15MFD	X014-4-11	60	X014-4-6	30
40-380B	X127-64-341A/B	15MFD	n/a	X014-4-15	40	X014-4-12	20
40-450B	X127-64-352A/B	12MFD	12MFD	X014-4-11	60	X014-4-6	30
40-550B	X127-64-352A/B	12MFD	12MFD	X014-4-11	60	X014-4-6	30

Three Phase, Model C

Model	Main Transformer	Cap value 1	Cap value 2	575V. AC Fuse
12-550C	X127-63-214TA/TB	5MFD	2.5MFD	X014-4-10
18-775C	X127-64-134TA/TB	10MFD	3MFD	X014-4-14
18-865C	X127-64-135TA/TB	15MFD	n/a	X014-4-9
18-960C	X127-64-137TA/TB	18MFD	n/a	X014-4-12
18-1050C	X127-64-137TA/TB	18MFD	n/a	X014-4-12
24-600C	X127-63-142TA/TB	15MFD	n/a	X014-4-9
24-960C	X127-64-147TA/TB	12MFD	15MFD	X014-4-16
24-1050C	X127-64-147TA/TB	12MFD	15MFD	X014-4-16

Three Phase, Model D

Model	Main Transformer	Cap value 1	Cap value 2	220V AC Fuse	220V Fuse value	380/440V AC Fuse	380/440V Fuse value
12-865D	X127-65-216A5E/B5E	12MFD	n/a	X014-4-16	25	X014-4-9	15
12-960D	X127-63-217A5E/B5E	18MFD	n/a	X014-4-6	30	X014-4-9	15
18-680D	X127-63-134A5E/B5E	18MFD	n/a	X014-4-6	30	X014-4-9	15
18-775D	X127-63-134A5E/B5E	18MFD	n/a	X014-4-1	35	X014-4-12	20
18-1050D	X127-64-137A5E/B5E	10MFD	12MFD	X014-4-15	40	X014-4-12	20

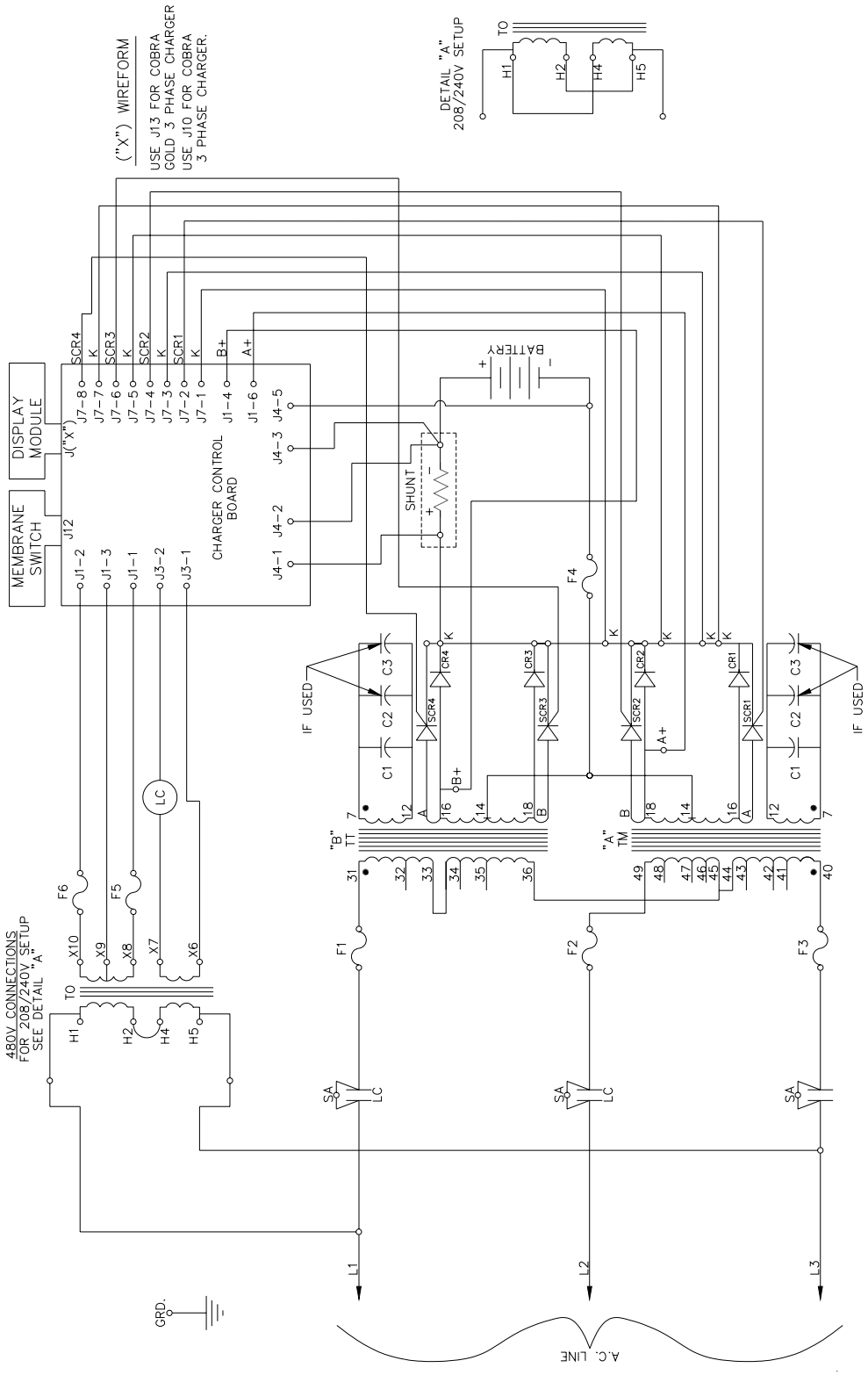
Single and Three Phase, Model J

Phase	Model	Main Transformer	Cap value 1	Cap value 2	480/550/600V AC Fuse	Fuse value
1ph	18-775J	X127-64-724AJ	15MFD	18MFD	X014-4-16	25
3ph	18-775J	X127-63-134AJ/BJ	4MFD	n/a	X014-4-9	15
3ph	18-865J	X127-64-135AJ/BJ	15MFD	n/a	X014-4-9	15
3ph	24-600J	X127-63-142AJ/BJ	15MFD	n/a	X014-4-9	15
3ph	24-680J	X127-64-144AJ/BJ	18MFD	n/a	X014-4-12	20
3ph	24-775J	X127-64-144AJ/BJ	18 MFD	n/a	X014-4-12	20
3ph	24-865J	X127-64-145AJ/BJ	10MFD	12MFD	X014-4-16/ X014-4-12	25/20
3ph	24-1050J	X127-64-147AJ/BJ	15MFD	n/a	X014-4-16	25
3ph	36-775J	X127-64-193AJ/BJ	12MFD	15MFD	X014-4-16	25

Parts by Output

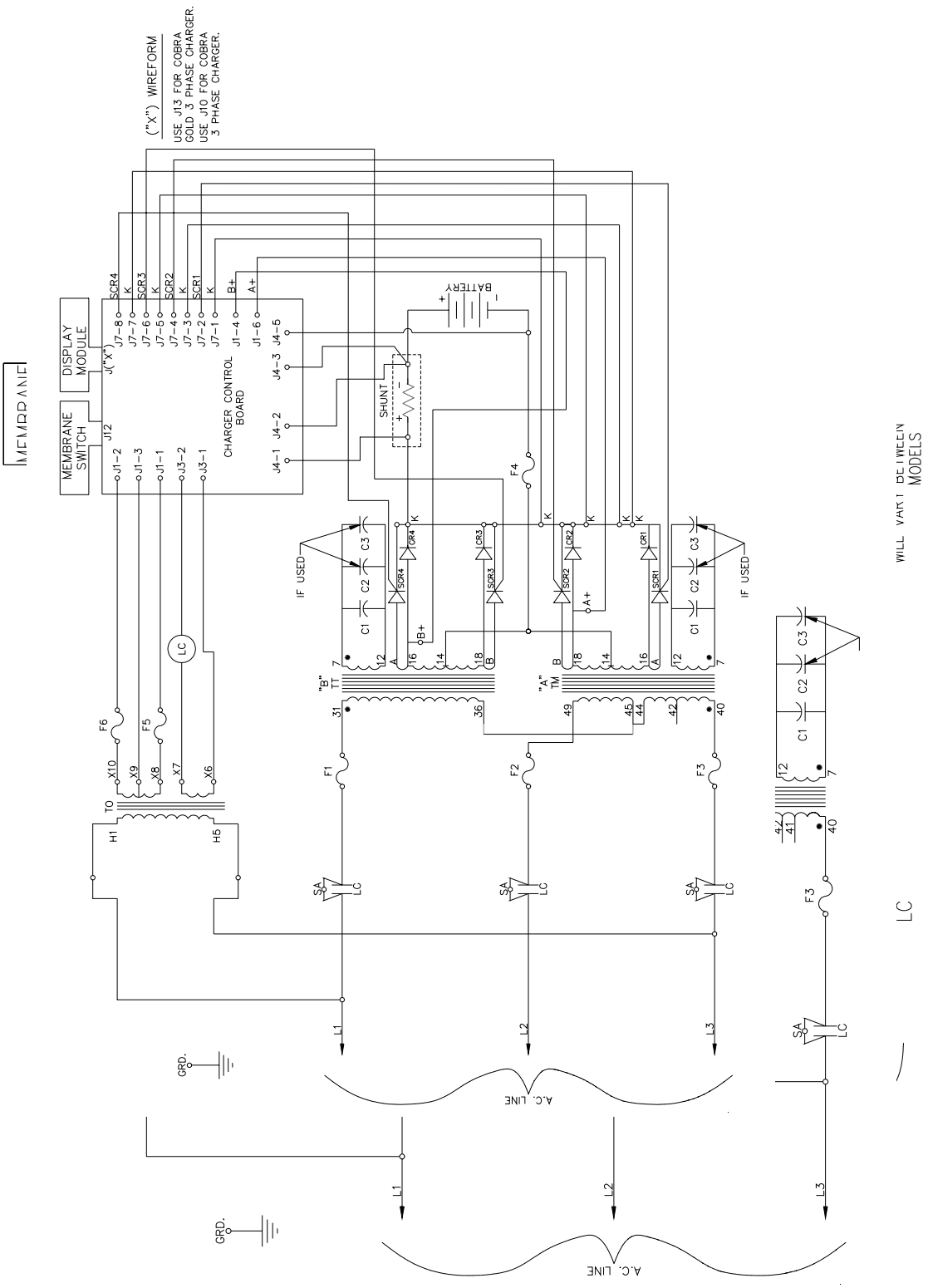
Phase	All Models	DC fuse	DC value	Heat Sink	Diode	Shunt
1ph	6-450	X014-11-1	125 A	R521-95-50	R507-12-1	X117-8-12
1ph	6-550	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	6-600	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	12-225	X014-11-18	60 A	R521-95-40	R507-12-68	X117-8-12
1ph	12-380	X014-11-2	100 A	R521-95-50	R507-12-1	X117-8-12
1ph	12-550	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	12-600	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	12-775	X014-11-9	200 A	R521-95-60	R507-12-2	X117-8-13
1ph	12-865	X014-11-10	225 A	R521-95-60	R507-12-2	X117-8-13
1ph	18-550	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	18-600	X014-11-3	150 A	R521-95-50	R507-12-1	X117-8-12
1ph	18-680	X014-11-9	200 A	R521-95-90	R507-12-1	X117-8-13
1ph	18-775	X014-11-9	200 A	R521-95-60	R507-12-2	X117-8-13
1ph	18-865	X014-11-10	225 A	R521-95-60	R507-12-2	X117-8-13
1ph	24-450	X014-11-1	125 A	R521-95-50	R507-12-1	X117-8-12
3ph	12-450	X014-11-1	125 A	R521-93-10	R507-12-68	X117-8-12
3ph	12-550	X014-11-3	150 A	R521-93-10	R507-12-68	X117-8-12
3ph	12-600	X014-11-3	150 A	R521-93-10	R507-12-68	X117-8-12
3ph	12-680	X014-11-9	200 A	R521-95-70	R507-12-68	X117-8-13
3ph	12-775	X014-11-9	200 A	R521-95-70	R507-12-68	X117-8-13
3ph	12-865	X014-11-10	225 A	R521-93-20	R507-12-1	X117-8-13
3ph	12-960	X014-11-1	2x 125 A	R521-93-20	R507-12-1	X117-8-13
3ph	12-1050	X014-11-1	2x 125 A	R521-93-20	R507-12-1	X117-8-13
3ph	18-380	X014-11-3	150 A	R521-93-10	R507-12-68	X117-8-12
3ph	18-600	X014-11-3	150 A	R521-93-10	R507-12-68	X117-8-12
3ph	18-680	X014-11-9	200 A	R521-95-70	R507-12-68	X117-8-13
3ph	18-775	X014-11-9	200 A	R521-95-70	R507-12-68	X117-8-13
3ph	18-865	X014-11-10	225 A	R521-93-20	R507-12-1	X117-8-13
3ph	18-960	X014-11-16	250 A	R521-93-20	R507-12-1	X117-8-13
3ph	18-1050	X014-11-13	350 A	R521-93-20	R507-12-1	X117-8-13
3ph	18-1200	X014-11-13	350 A	R521-93-30A	R507-12-2A	X117-8-13
3ph	18-1400	X014-11-16	2x 250 A	R521-93-30A	R507-12-2A	X117-8-13
3ph	18-1500	X014-11-16	2x 250 A	R521-93-30A	R507-12-2A	X117-8-13
3ph	24-450	X014-11-3	150 A	R521-93-10A	R507-12-68A	X117-8-12
3ph	24-550	X014-11-3	150 A	R521-93-10A	R507-12-68A	X117-8-12
3ph	24-600	X014-11-3	150 A	R521-93-10A	R507-12-68A	X117-8-12
3ph	24-680	X014-11-9	200 A	R521-95-75A	R507-12-68A	X117-8-13
3ph	24-775	X014-11-9	200 A	R521-95-70A	R507-12-68A	X117-8-13
3ph	24-865	X014-11-10	225 A	R521-93-20A	R507-12-1A	X117-8-13
3ph	24-960	X014-11-1	2x 125 A	R521-93-20A	R507-12-1A	X117-8-13
3ph	24-1050	X014-11-1	2x 125 A	R521-93-20A	R507-12-1A	X117-8-13
3ph	36-380	X014-30-3	FWA 150A	R521-98-10A	R507-12-68A	X117-8-12
3ph	36-550	X014-30-3	FWA 150A	R521-98-10A	R507-12-68A	X117-8-12
3ph	36-775	X014-30-5	FWA 200A	R521-98-20A	R507-12-68A	X117-8-13

SCHEMATIC, 3 PH, 208/240/480V, 60 Hz

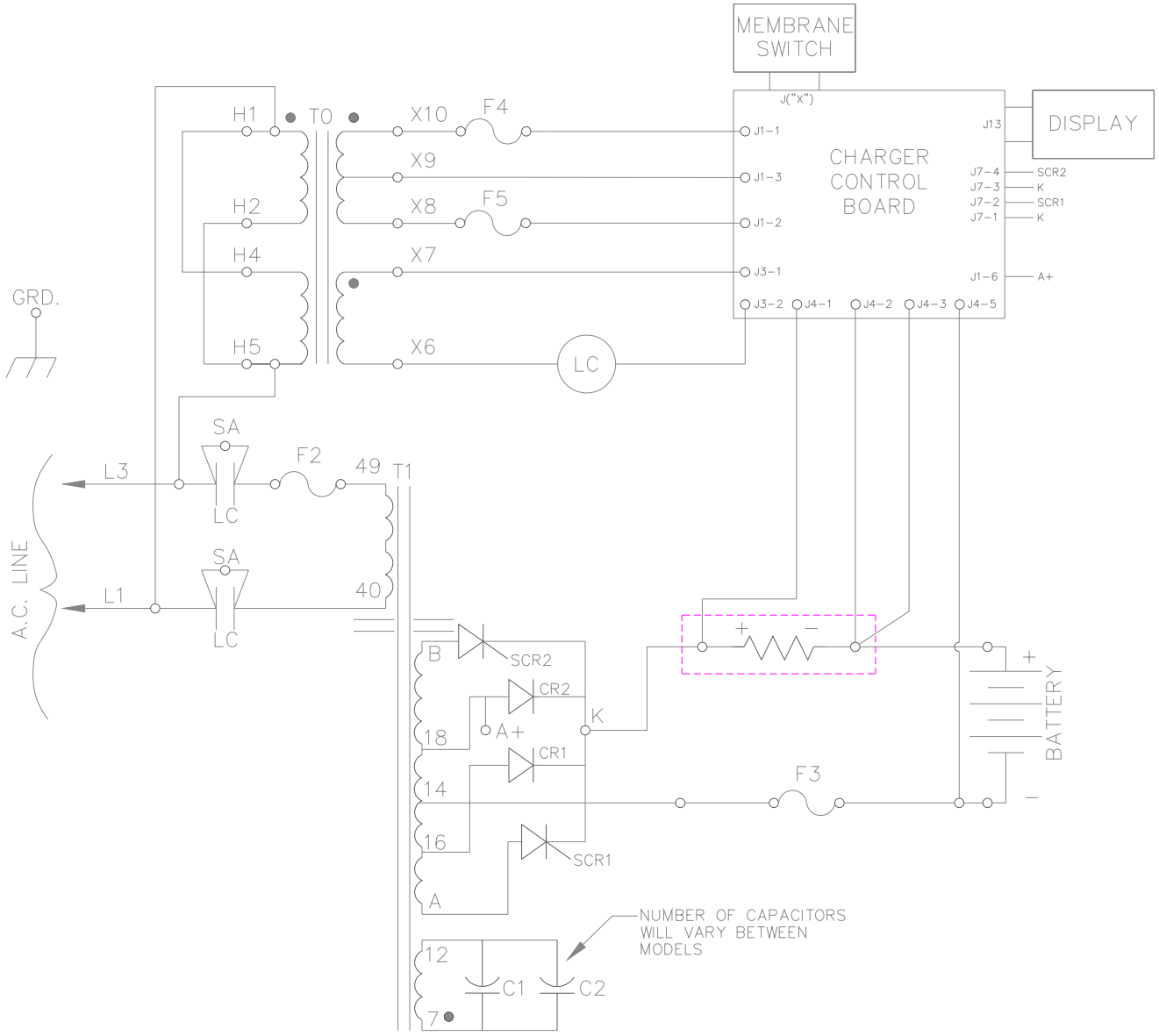


SCHEMATIC, THREE PHASE, MODEL C

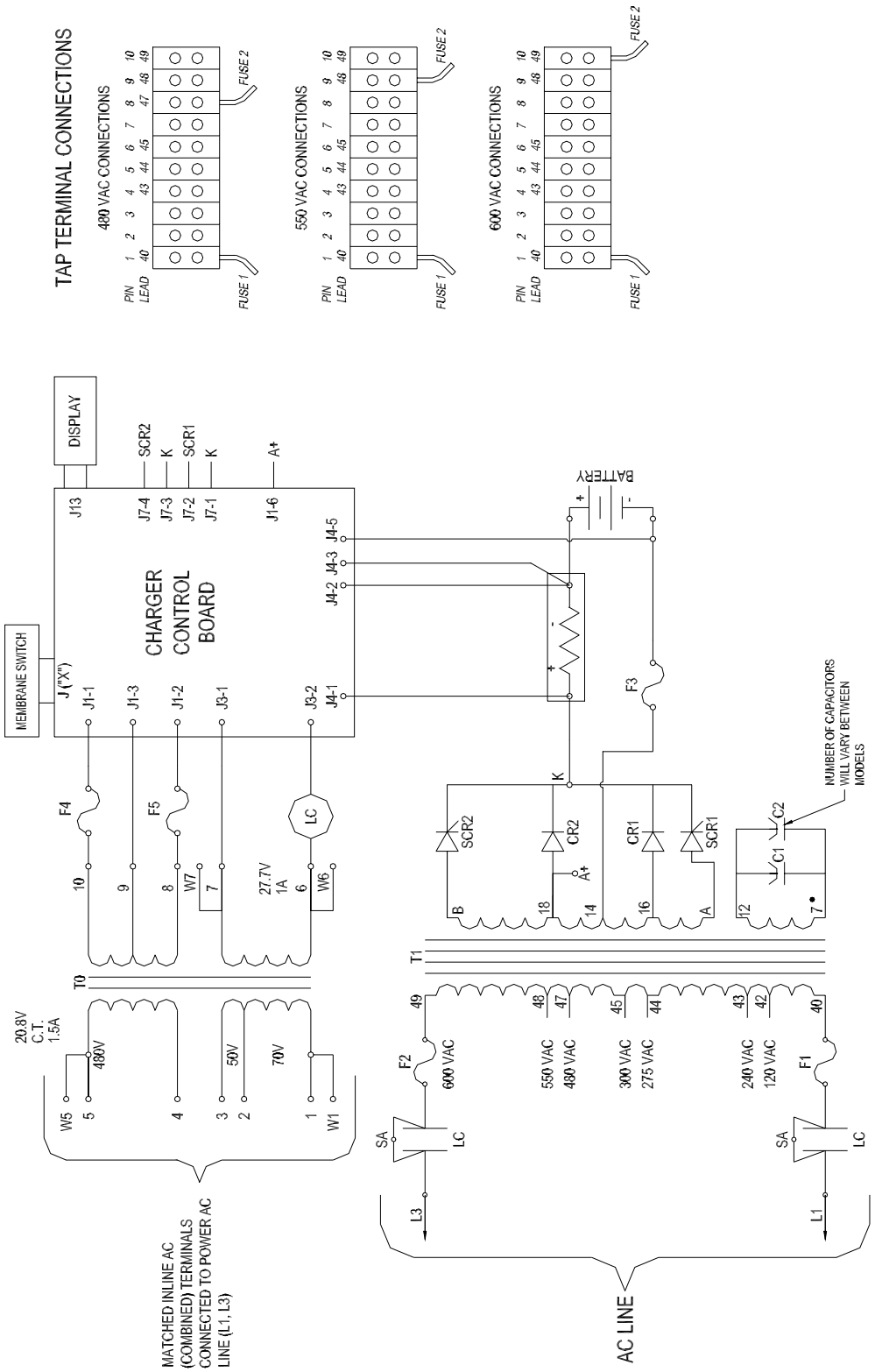
SHOWN CONNECTED FOR 575 VOLTS.



SCHEMATIC, 1PH, 120V

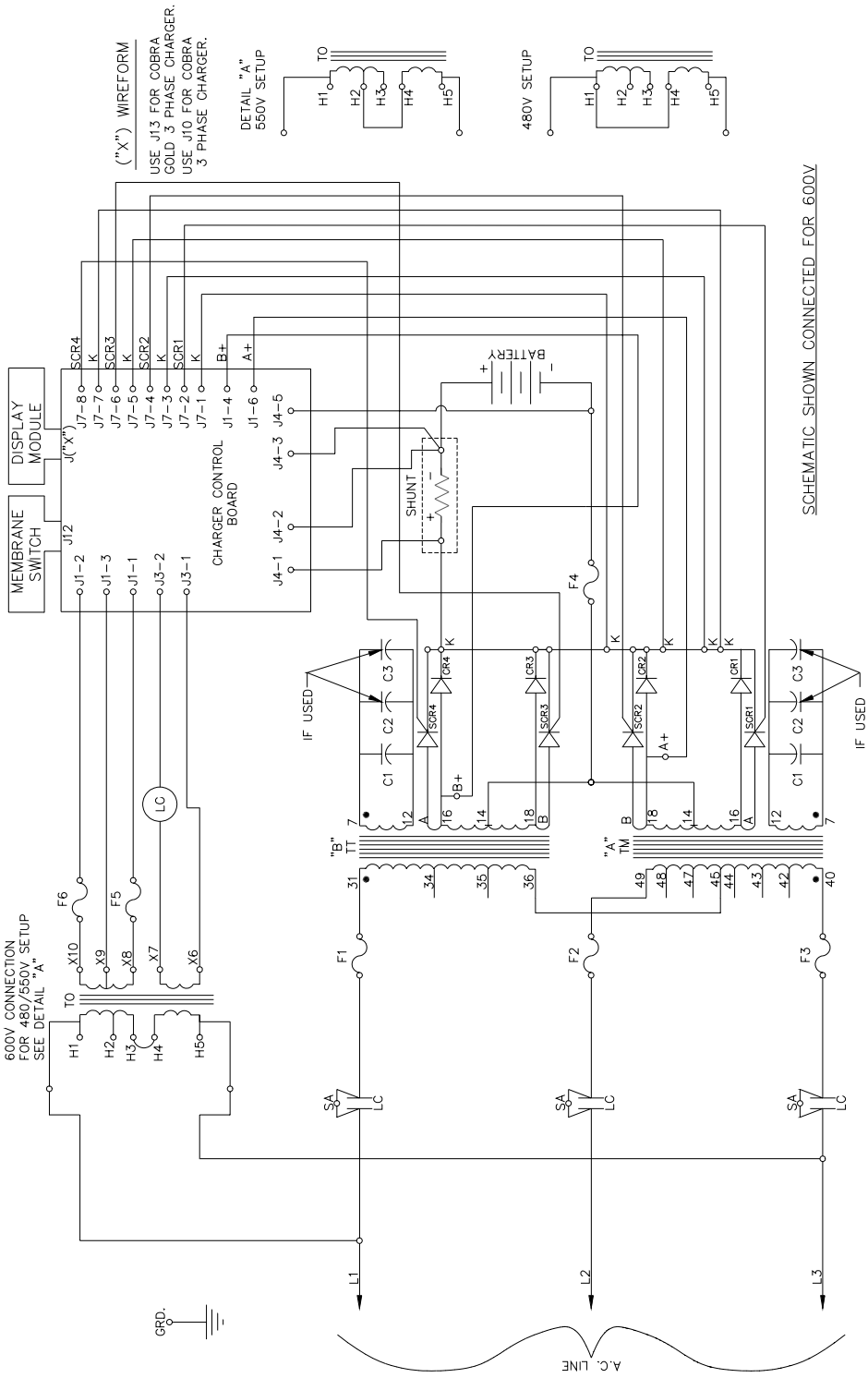


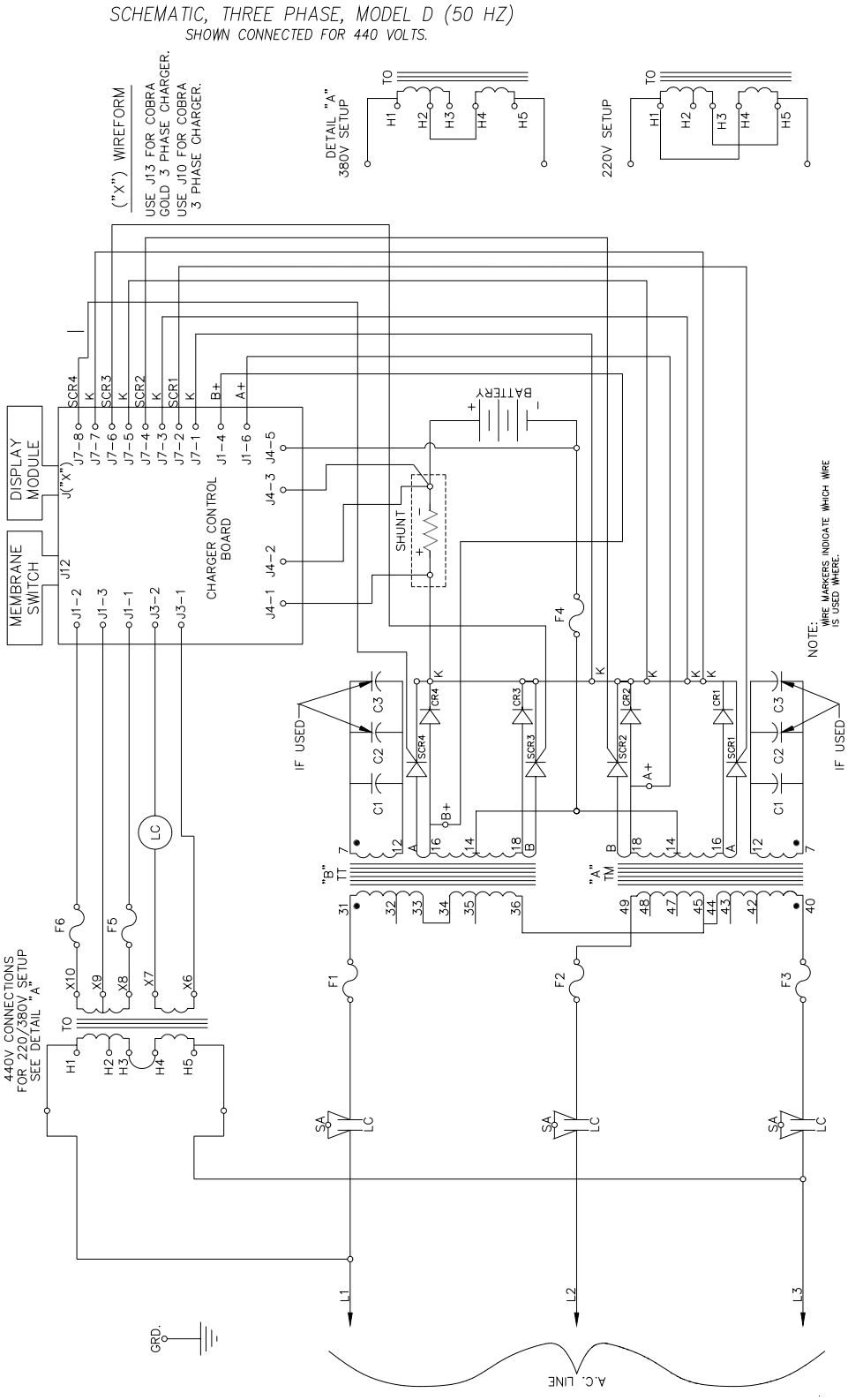
SCHEMATIC, SINGLE PHASE MODEL J

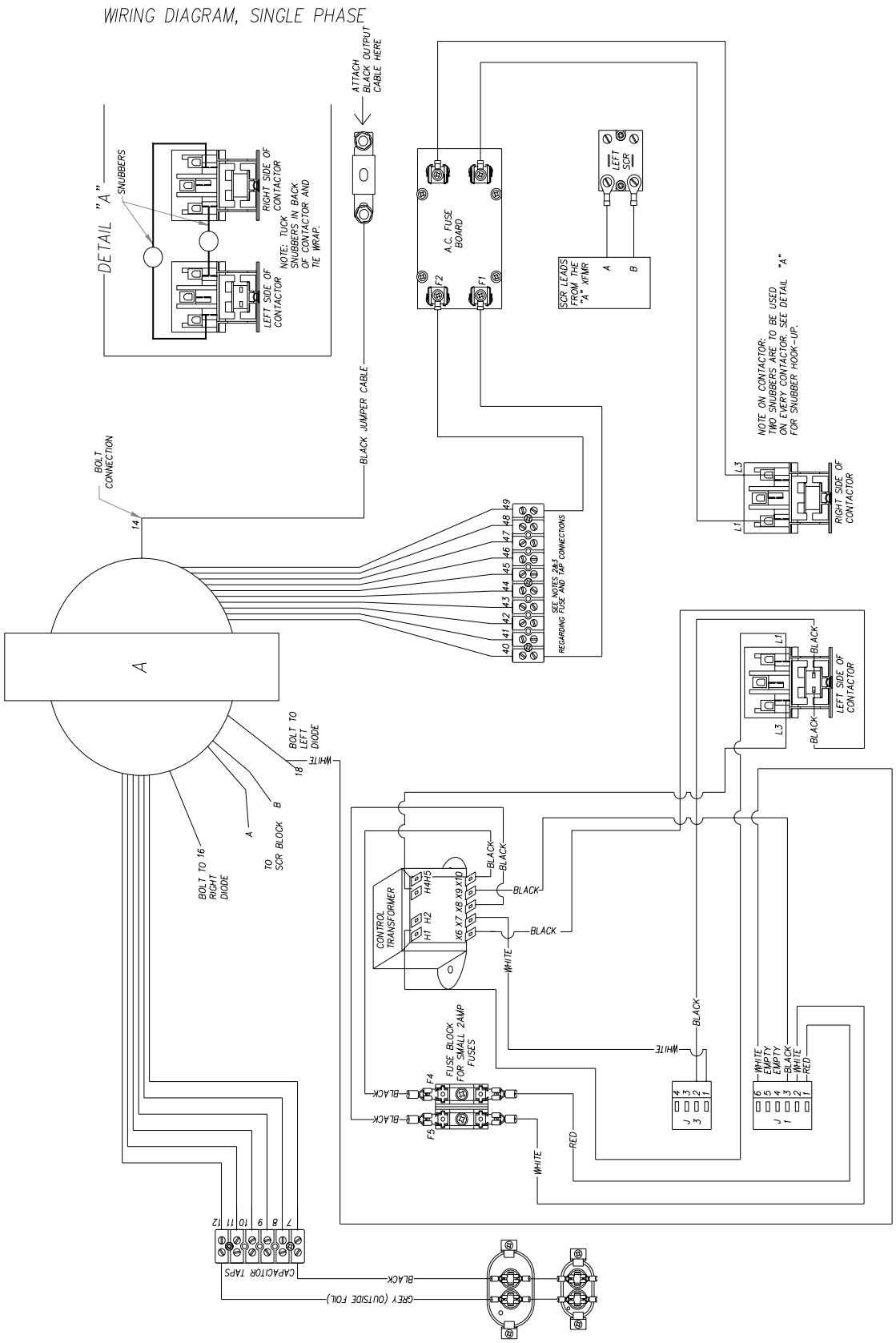


SCHEMATIC, THREE PHASE, MODEL J

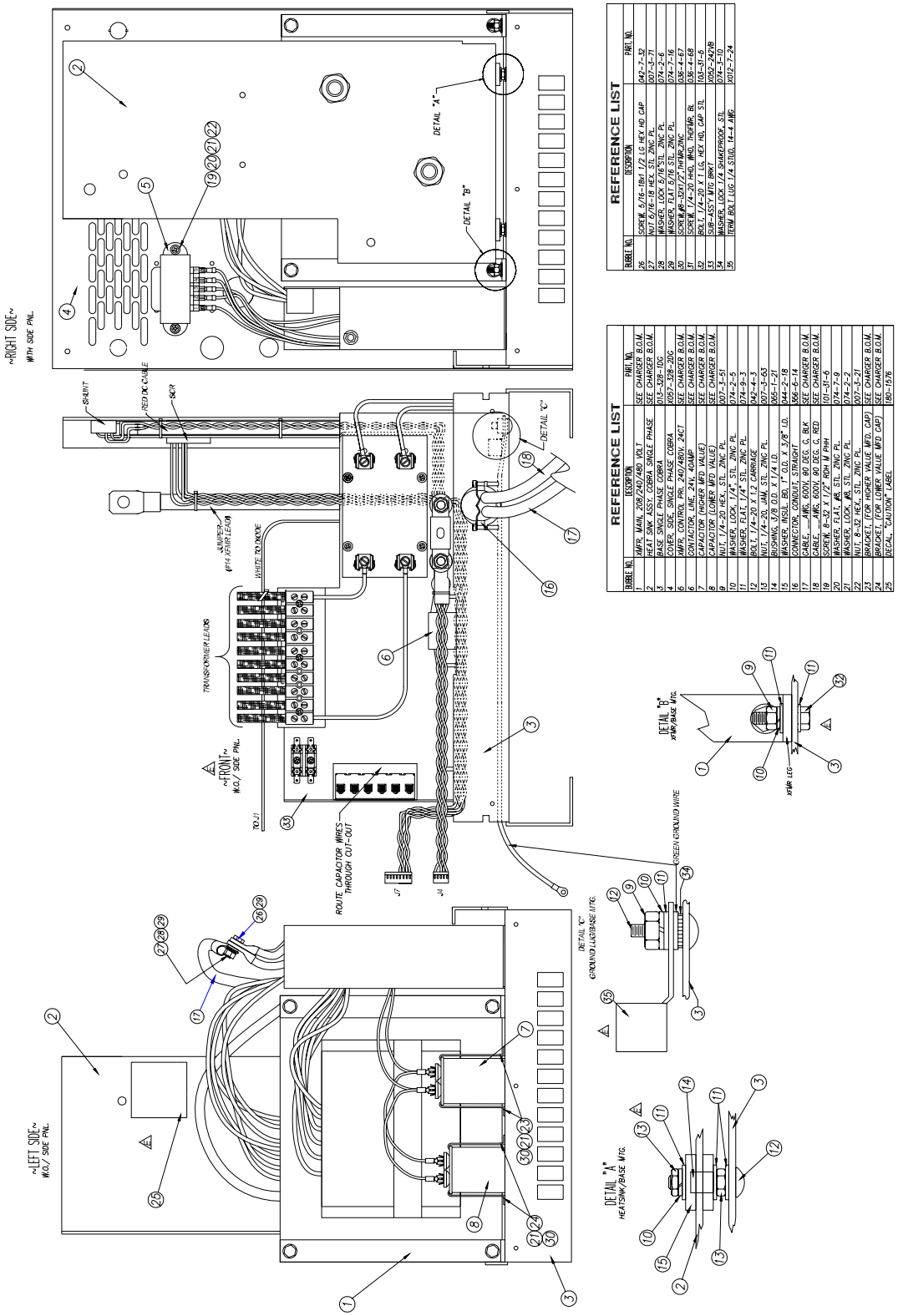
SHOWN CONNECTED FOR 600 VOLTS.




SCHEMATIC, THREE PHASE, MODEL D (50 HZ)
SHOWN CONNECTED FOR 440 VOLTS.
("X") WIREFORM
USE J13 FOR COBRA COLD 3 PHASE CHARGER.
USE J10 FOR COBRA 3 PHASE CHARGER.
DETAIL "A" 380V SETUP
220V SETUP
DISPLAY MODULE
MEMBRANE SWITCH
CHARGER CONTROL BOARD
BATTERY
SHUNT
440V CONNECTIONS FOR 220/380V SETUP SEE DETAIL "A"
IF USED
NOTE: WIRE MARKERS INDICATE WHICH WIRE IS USED WHERE.
GRD.
A.C. LINE


WIRING DIAGRAM, SINGLE PHASE
DETAIL "A"
SNUBBERS
RIGHT SIDE OF CONTACTOR
LEFT SIDE OF CONTACTOR
NOTE: TUCK SNUBBERS IN BACK OF CONTACTOR AND TIE WRAP.
ATTACH BLACK OUTPUT CABLE HERE
A.C. FUSE BOARD
F1
F2
LEFT SCR
SCR LEADS FROM THE "A" XFMR
A
B
NOTE ON CONTACTOR: TWO SNUBBERS ARE TO BE USED ON EVERY CONTACTOR. SEE DETAIL "A" FOR SNUBBER HOOK-UP.
L3
L1
RIGHT SIDE OF CONTACTOR
BLACK JUMPER CABLE
BOLT CONNECTION
14
H9
H8
H7
H6
H5
H4
H3
H2
H1
40
41
42
43
44
45
46
47
48
49
SEE NOTES 2&3 REGARDING FUSE AND TAP CONNECTIONS
A
BOLT TO LEFT DIODE
18
WHITE
B
A
TO SCR BLOCK
BOLT TO 16 RIGHT DIODE
L1
BLACK
L3
BLACK
LEFT SIDE OF CONTACTOR
CONTROL TRANSFORMER
H4 H5
H1 H2
X6 X7 X8 X9 X10
BLACK
BLACK
BLACK
WHITE
FUSE BLOCK FOR SMALL 2AMP FUSES
F4
F5
BLACK
BLACK
WHITE
BLACK
RED
WHITE
RED
WHITE
EMPTY
EMPTY
BLACK
WHITE
RED
7 8 9 10 11 12
CAPACITOR TAPS
BLACK
GREY (OUTSIDE FOIL)

ASSEMBLY, SINGLE PHASE, WIRING

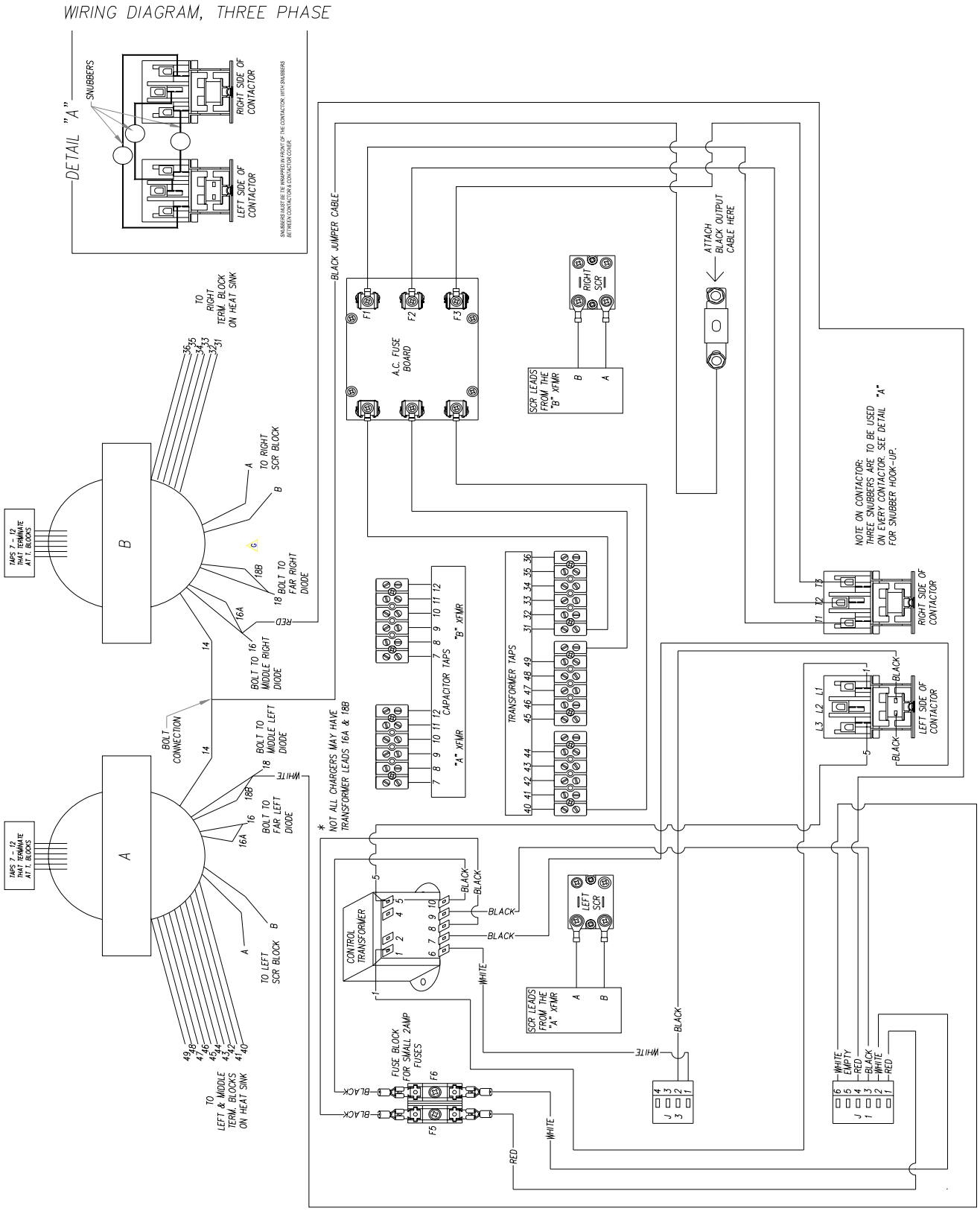


REFERENCE LIST

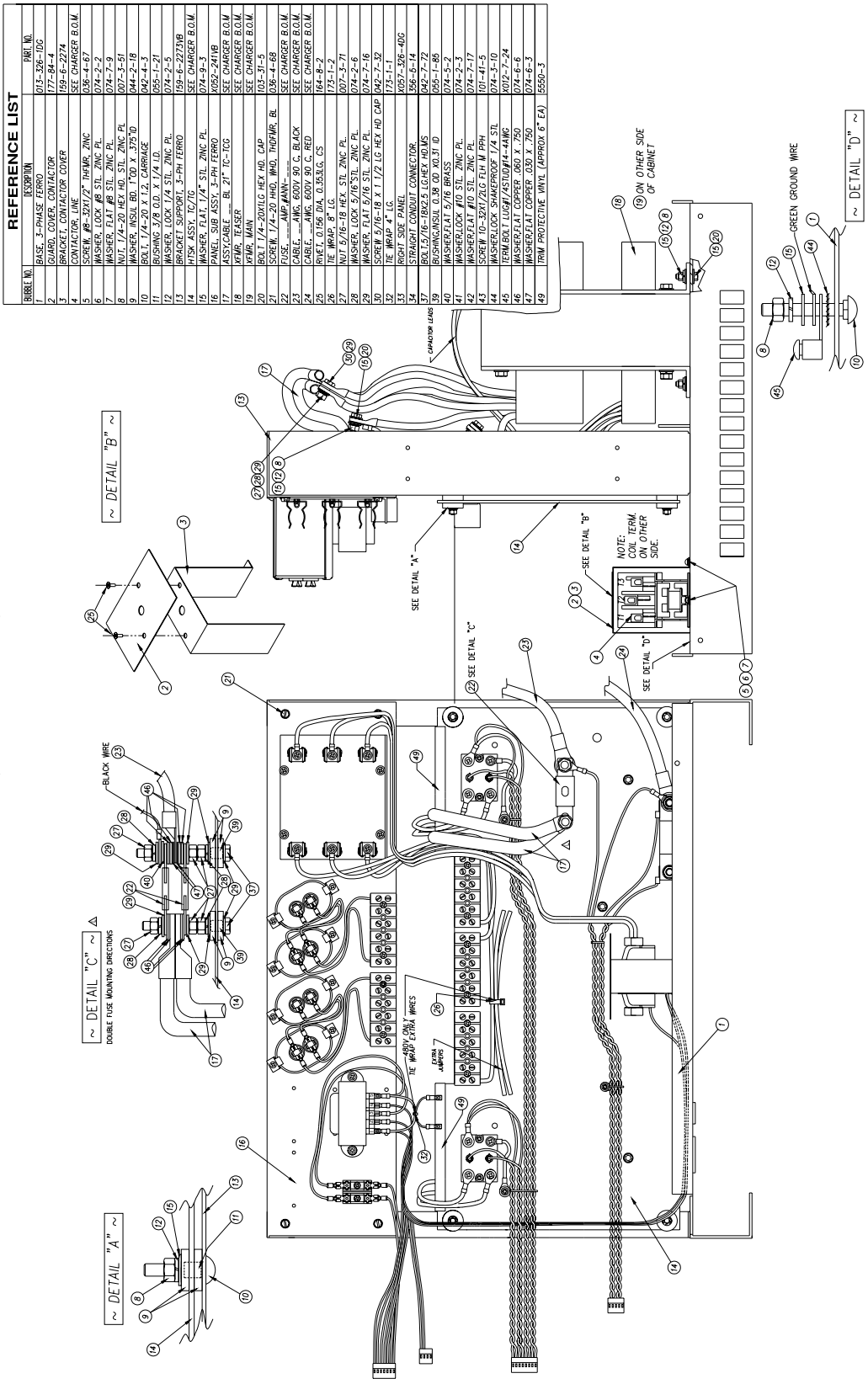
BUBBLE NO.	DESCRIPTION	PART NO.
1	XMFR, MAIN, 208/240/480 VOLT	SEE CHARGER B.O.M.
2	HEAT SINK ASSY, COBRA SINGLE PHASE	SEE CHARGER B.O.M.
3	BASE SINGLE PHASE COBRA	0113-328-10G
4	COVER, SIDE, SINGLE PHASE COBRA	X0157-328-20G
6	XMFR, CONTROL PRI., 240/480V, 24CT	SEE CHARGER B.O.M.
7	CAPACITOR (HIGHER MFD VALUE)	SEE CHARGER B.O.M.
8	CAPACITOR (LOWER MFD VALUE)	SEE CHARGER B.O.M.
9	NUT, 1/4-20 HEX., STL. ZINC PL.	007-5-01
10	WASHER, LOCK, 1/4", STL. ZINC PL.	074-2-5
11	WASHER, FLAT, 1/4" STL. ZINC PL.	074-9-3
12	BOLT, 1/4-20 X 1 1/2 CARRIAGE	042-4-3
13	NUT, 1/4-20, JAM, STL. ZINC PL.	X007-3-63
14	BUSHING, 3/8 I.D. X 1/4 I.D.	X065-1-21
15	WASHER, NYLON, 3/8 I.D. X 7/8 O.D. X 1/8" I.D.	X044-2-18
16	CAPACITOR, CONDUIT, STRAIGHT	X065-1-20
17	CABLE, AWG, 600V, 90 DEG. C, BLK	SEE CHARGER B.O.M.
18	CABLE, AWG, 600V, 90 DEG. C, RED	SEE CHARGER B.O.M.
19	SCREW, 8-32 X 1/2" ROH W PHH	101-37-6
20	WASHER, FLAT, #8, STL. ZINC PL.	074-7-9
21	WASHER, LOCK, #8, STL. ZINC PL.	074-2-2
22	NUT, 8-32 HEX., STL. ZINC PL.	X007-5-21
23	BRACKET, (FOR HIGHER VALUE MFD. CAP)	SEE CHARGER B.O.M.
24	BRACKET, (FOR LOWER VALUE MFD CAP)	SEE CHARGER B.O.M.
25	DECAL, CAUTION LABEL	X85-1578

REFERENCE LIST

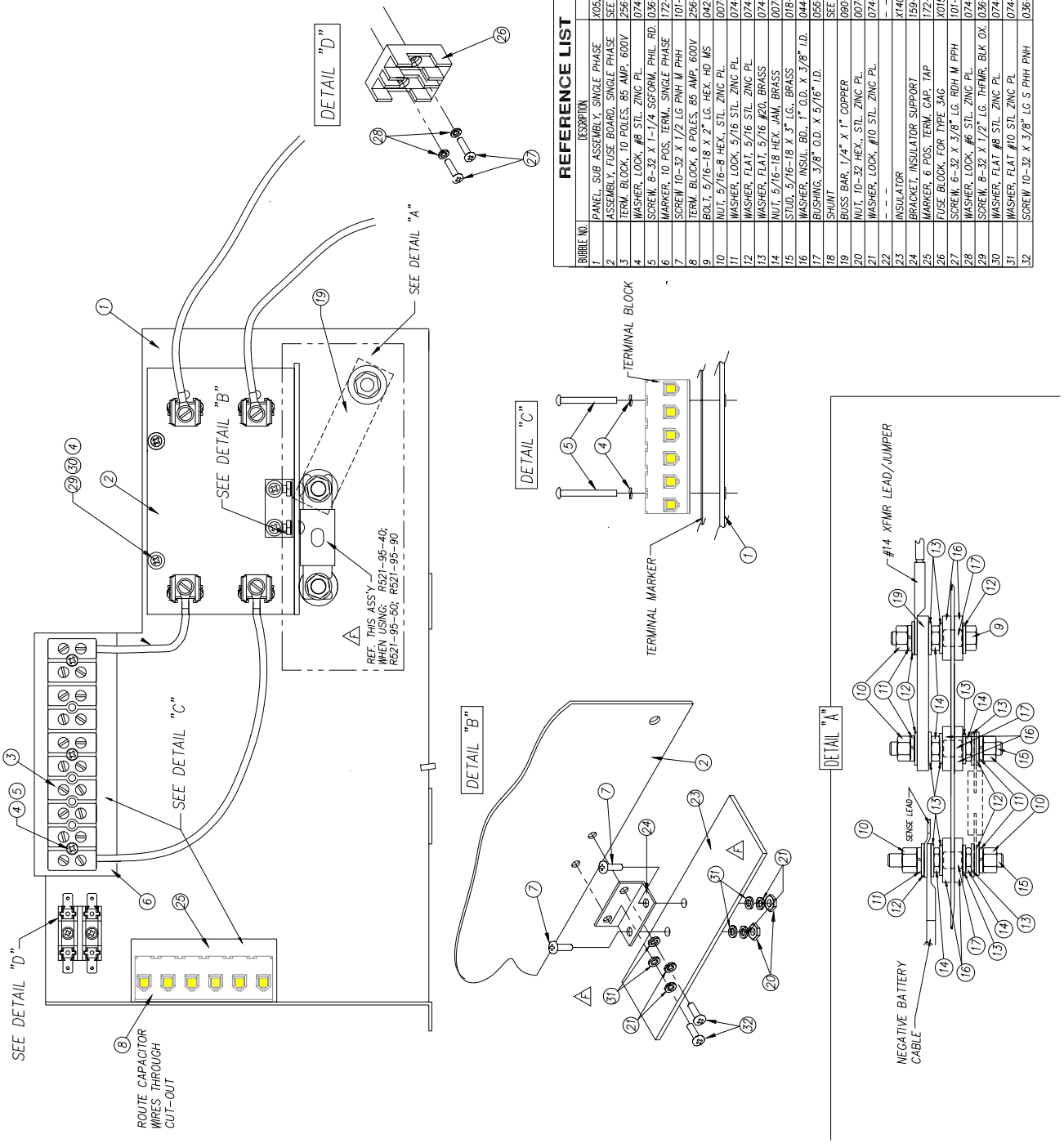
BUBBLE NO.	DESCRIPTION	PART NO.
26	SCREW, 5/16-18x1 1/2 LG. HEX HD CAP	042-7-32
27	NUT 5/16-18 HEX. STL. ZINC PL.	007-3-71
28	WASHER, LOCK 5/16"STL. ZINC PL.	074-2-6
29	WASHER, FLAT 5/16 STL. ZINC PL.	074-7-16
30	SCREW,#8-32X1/2,THK,ZINC	038-4-67
31	SCREW,1/4-20X3/4,THK,HEX WSHR, BL	038-4-68
32	BOLT, 1/4-20 X 1 LG. HEX HD. CAP STL	103-31-5
33	SUB-ASSY MTG BRKT	X052-242/09
34	WASHER, LOCK 1/4 SHAKEPROOF, STL	074-3-10
35	TERM. BOLT LUG 1/4 STUD, 14-4 AWG	X012-7-24


WIRING DIAGRAM, THREE PHASE
DETAIL "A"
SNUBBERS
RIGHT SIDE OF CONTACTOR
LEFT SIDE OF CONTACTOR
SNUBBERS MUST BE TIE WRAPPED IN FRONT OF THE CONTACTOR, WITH SNUBBERS BETWEEN CONTACTOR & CONTACTOR COVER.
BLACK JUMPER CABLE
ATTACH BLACK OUTPUT CABLE HERE
A.C. FUSE BOARD
F1
F2
F3
RIGHT SCR
SCR LEADS FROM THE "B" XFMR
TO RIGHT TERM. BLOCK ON HEAT SINK
TO RIGHT SCR BLOCK
BOLT TO FAR RIGHT DIODE
BOLT TO MIDDLE RIGHT DIODE
BOLT CONNECTION
BOLT TO MIDDLE LEFT DIODE
BOLT TO FAR LEFT DIODE
TO LEFT SCR BLOCK
TO LEFT & MIDDLE TERM. BLOCKS ON HEAT SINK
TAPS 7 - 12 THAT TERMINATE AT T. BLOCKS
B
A
NOTE ON CONTACTOR: THREE SNUBBERS ARE TO BE USED ON EVERY CONTACTOR. SEE DETAIL "A" FOR SNUBBER HOOK-UP.
RIGHT SIDE OF CONTACTOR
LEFT SIDE OF CONTACTOR
TRANSFORMER TAPS
CAPACITOR TAPS
"A" XFMR
"B" XFMR
* NOT ALL CHARGERS MAY HAVE TRANSFORMER LEADS 16A & 18B
CONTROL TRANSFORMER
LEFT SCR
SCR LEADS FROM THE "A" XFMR
FUSE BLOCK FOR SMALL 2AMP FUSES
F5
F6
BLACK
WHITE
RED
WHITE
EMPTY
RED
BLACK
WHITE
RED

ASSEMBLY, THREE PHASE, WIRING



ASSEMBLY, SINGLE PHASE, COMPONENT SUB-ASSEMBLY



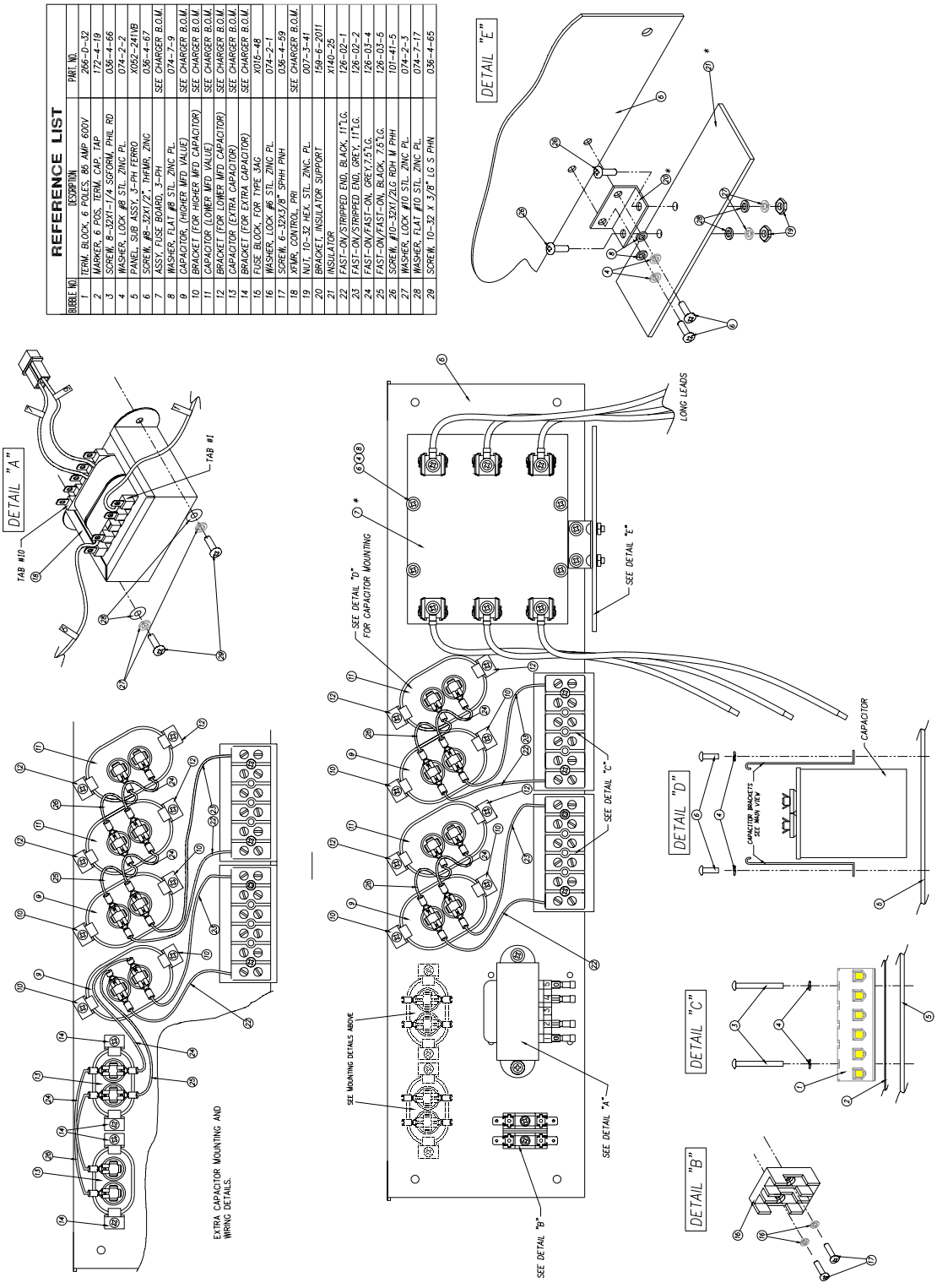
REFERENCE LIST

BUBBLE NO.	DESCRIPTION	PART NO.
1	PANEL, SUB ASSEMBLY, SINGLE PHASE	X052-242VB
2	ASSEMBLY, FUSE BOARD, SINGLE PHASE	SEE CHARGER B.O.M.
3	TERM. BLOCK, 10 POLES, 85 AMP, 600V	256-D-33
4	WASHER, LOCK, #8 STL. ZINC PL.	074-2-2
5	SCREW, 8-32 X 1-1/4 SQFORM, PHIL. RD.	036-4-66
6	MARKER, 10 POS, TERM., SINGLE PHASE	172-4-18
7	SCREW 10-32 X 1/2 LG PNH W PHH	101-41-5
8	TERM. BLOCK, 6 POLES, 85 AMP, 600V	256-D-32
9	BOLT, 5/16-18 X 2" LG. HEX. HD MS	042-7-52
10	NUT, 5/16-8 HEX., STL. ZINC PL.	007-3-71
11	WASHER, LOCK, 5/16 STL. ZINC PL.	074-2-6
12	WASHER, FLAT, 5/16 STL. ZINC PL.	074-7-16
13	WASHER, FLAT, 5/16 #20, BRASS	074-4-6
14	NUT, 5/16-18 HEX. JAM, BRASS	007-5-74
15	STUD, 5/16-18 X 3" LG., BRASS	018-4-19
16	WASHER, INSUL BD., 1" O.D. X 3/8" I.D.	044-2-18
17	BUSHING, 3/8" O.D. X 5/16" I.D.	056-1-85
18	SHUNT	SEE CHARGER B.O.M.
19	BUSS BAR, 1/4" X 1" COPPER	090-2-66
20	NUT, 10-32 HEX., STL. ZINC PL.	007-3-41
21	WASHER, LOCK, #10 STL. ZINC PL.	074-2-3
22	- - -	- -
23	INSULATOR	X140-25
24	BRACKET, INSULATOR SUPPORT	159-6-2011
25	MARKER, 6 POS, TERM. CAP. TAP	172-4-19
26	FUSE BLOCK, FOR TYPE 3AG	X015-48
27	SCREW, 6-32 X 3/8" LG. RDH M PPH	101-11-4
28	WASHER, LOCK, #6 STL. ZINC PL.	074-2-1
29	SCREW, 8-32 X 1/2" LG. THFMR, BLK OX.	036-4-67
30	WASHER, FLAT #8 STL. ZINC PL.	074-7-9
31	WASHER, FLAT #10 STL. ZINC PL.	074-7-17
32	SCREW 10-32 X 3/8" LG S PHH PNH	036-4-65

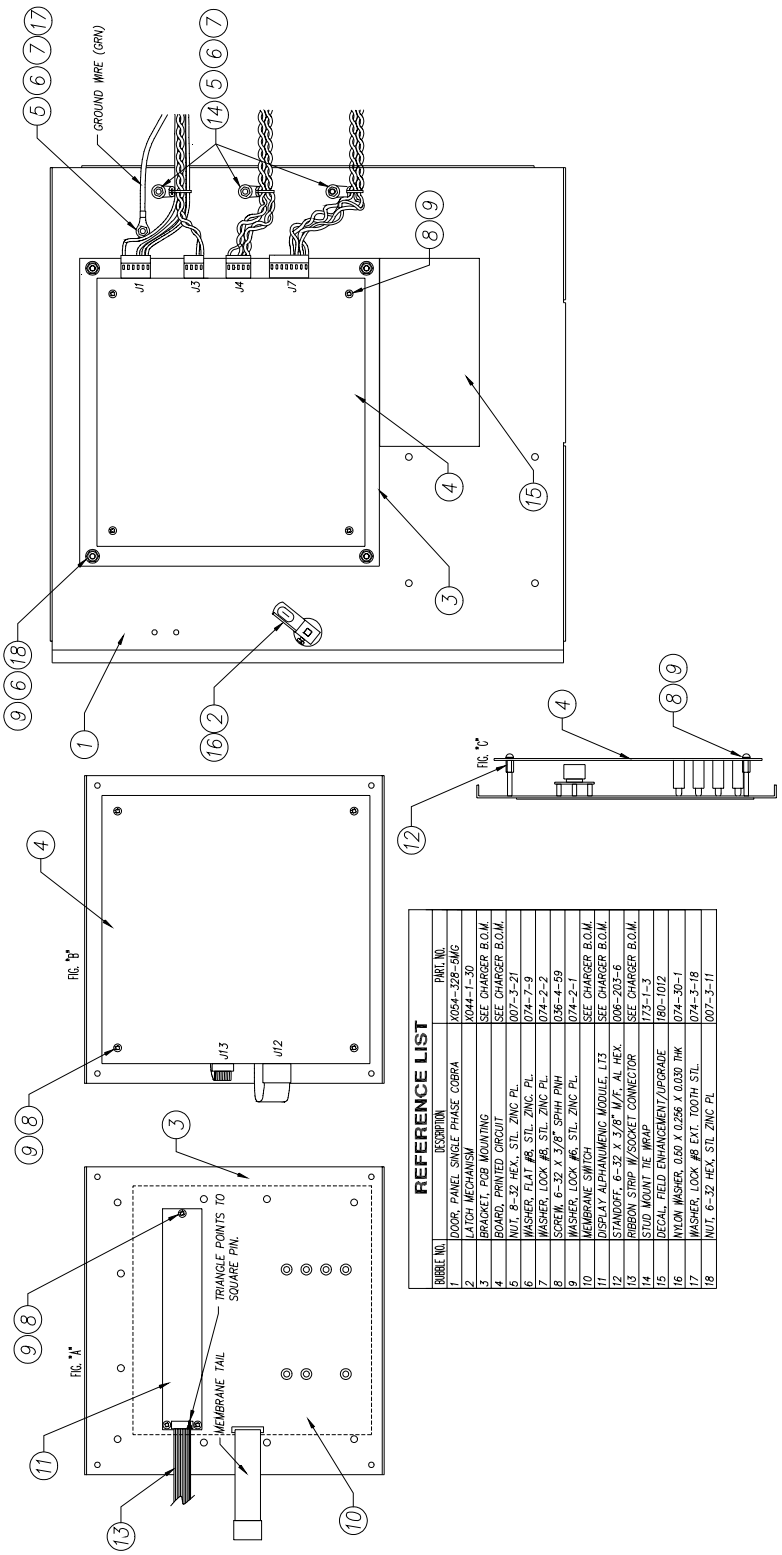
ASSEMBLY, THREE PHASE, COMPONENT SUB-ASSEMBLY

REFERENCE LIST

BUBBLE NO.	DESCRIPTION	PART NO.
1	TERM. BLOCK, 6 POLES, 85 AMP 600V	266-0-32
2	MARKER, 6 POS, TERM. CAP. TAP	172-4-19
3	SCREW, 8-32X1-1/4 SQFORM, PHIL RD	036-4-66
4	WASHER, LOCK #8 STL. ZINC PL.	074-2-2
5	PANEL, SUB ASSY, 3-PH FERRO	X052-241VB
6	SCREW, #8-32X1/2", THFMR, ZINC	036-4-67
7	ASSY, FUSE BOARD, 3-PH	SEE CHARGER B.O.M.
8	WASHER, FLAT #8 STL. ZINC PL.	074-2-9
9	CAPACITOR, (HIGHER MFD. VALUE)	SEE CHARGER B.O.M.
10	BRACKET (FOR HIGHER MFD CAPACITOR)	SEE CHARGER B.O.M.
11	CAPACITOR (LOWER MFD VALUE)	SEE CHARGER B.O.M.
12	BRACKET (FOR LOWER MFD CAPACITOR)	SEE CHARGER B.O.M.
13	CAPACITOR (EXTRA CAPACITOR)	SEE CHARGER B.O.M.
14	BRACKET (FOR EXTRA CAPACITOR)	SEE CHARGER B.O.M.
16	FUSE BLOCK, FOR TYPE 3AG	X015-48
16	WASHER, LOCK #6 STL. ZINC PL.	074-2-1
17	SCREW, 6-32X3/8" SPHH PAH	036-4-59
18	XFMR, CONTROL, PRI	SEE CHARGER B.O.M.
19	NUT, 10-32 HEX. STL. ZINC. PL.	007-3-41
20	BRACKET, INSULATOR SUPPORT	159-6-2011
21	INSULATOR	X140-25
22	FAST-ON/STRIPPED END, BLACK, 11"LG.	126-02-1
23	FAST-ON/STRIPPED END, GREY, 11"LG.	126-02-2
24	FAST-ON/FAST-ON, GREY,7.5"LG.	126-03-4
25	FAST-ON/FAST-ON, BLACK, 7.5"LG.	126-03-6
26	SCREW, #10-32X1/2LG ROH W PHH	101-41-5
27	WASHER, LOCK #10 STL. ZINC PL.	074-2-3
28	WASHER, FLAT #10 STL. ZINC PL.	074-7-17
29	SCREW, 10-32 X 3/8" LG S PHH	036-4-65



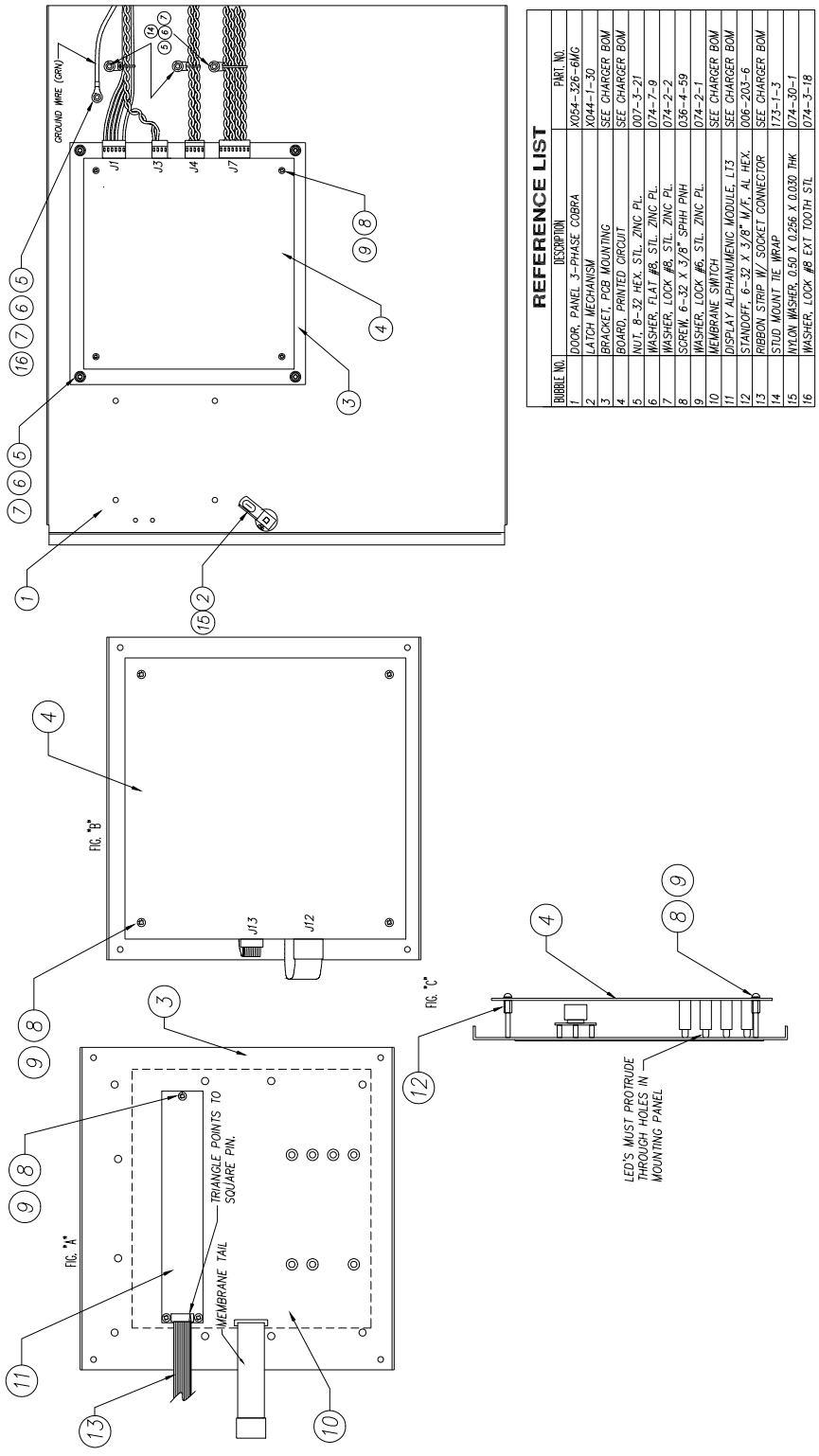
ASSEMBLY, SINGLE PHASE, DOOR



REFERENCE LIST

BUBBLE NO.	DESCRIPTION	PART NO.
1	DOOR, PANEL, SINGLE PHASE COBRA	X054-328-GMG
2	LATCH MECHANISM	X044-1-30
3	BRACKET, PCB MOUNTING	SEE CHARGER B.O.M.
4	BOARD, PRINTED CIRCUIT	SEE CHARGER B.O.M.
5	NUT, 8-32 HEX, STL ZINC PL	007-3-21
6	WASHER, FLAT #8, STL ZINC PL	074-7-9
7	WASHER, LOCK #8, STL ZINC PL	074-2-2
8	SCREW, 6-32 X 3/8", SPHH PHH	036-4-69
9	WASHER, LOCK #6, STL ZINC PL	074-2-1
10	MEMBRANE SWITCH	SEE CHARGER B.O.M.
11	DISPLAY ALPHANUMENIC MODULE, LT3	SEE CHARGER B.O.M.
12	STANDOFF, 6-32 X 3/8" M/F, AL HEX.	006-203-6
13	RIBBON STRIP W/SOCKET CONNECTOR	SEE CHARGER B.O.M.
14	STUD MOUNT TIE WRAP	173-1-3
15	DECAL, FIELD ENHANCEMENT/UPGRADE	180-1012
16	NYLON WASHER, 0.50 X 0.256 X 0.030 THK	074-30-1
17	WASHER, LOCK #8 EXT. TOOTH STL.	074-3-18
18	NUT, 6-32 HEX, STL ZINC PL	007-3-11

ASSEMBLY, THREE PHASE, DOOR



REFERENCE LIST

BUBBLE NO.	DESCRIPTION	PART NO.
1	DOOR, PANEL 3-PHASE COBRA	X054-326-6MC
2	LATCH MECHANISM	X044-1-30
3	BRACKET, PCB MOUNTING	SEE CHARGER BOM
4	BOARD, PRINTED CIRCUIT	SEE CHARGER BOM
5	NUT, 8-32 HEX. STL. ZINC PL.	007-3-21
6	WASHER, FLAT #8, STL. ZINC PL.	074-7-9
7	WASHER, LOCK #8, STL. ZINC PL.	074-2-2
8	SCREW, 6-32 X 3/8" SPHH PNH	036-4-59
9	WASHER, LOCK #6, STL. ZINC PL.	074-2-1
10	MEMBRANE SWITCH	SEE CHARGER BOM
11	DISPLAY ALPHANUMERIC MODULE, LT3	SEE CHARGER BOM
12	STANDOFF, 6-32 X 3/8" M/F, AL HEX.	006-203-6
13	RIBBON STRIP W/ SOCKET CONNECTOR	SEE CHARGER BOM
14	STUD MOUNT TIE WRAP	173-1-3
15	NYLON WASHER, 0.50 X 0.256 X 0.030 THK	074-30-1
16	WASHER, LOCK #8 EXT TOOTH STL	074-3-18

Maintenance

1. Installation

Model:	S/N:	AC Input Voltage:
Date:	Installed by:	

2. Modifications to Factory Settings

Date	Variable	Change	Service Technician

3. Service

Date	Description	Service Technician